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Issued September 1958

SOIL SURVEY

De Kalb County Alabama

OUR SOIL ★ OUR STRENGTH

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service

In cooperation with

ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES
ALABAMA AGRICULTURAL EXPERIMENT STATION
TENNESSEE VALLEY AUTHORITY

How to Use THE SOIL SURVEY REPORT

THIS SURVEY of De Kalb County will help you plan the kind of farming that will protect your soils and provide good yields. It describes the soils, shows their location on a map, and tells what they will do under different kinds of management.

Find your farm on the map

In using this survey, you start with the soil map, which consists of the 74 sheets bound in the back of this report. These sheets, if laid together, make a large photographic map of the county as it looks from an airplane. You can see woods, fields, roads, rivers, and many other landmarks on this map.

To find your farm on the large map, you use the index to map sheets. This is a small map of the county on which numbered rectangles have been drawn to show the position of each sheet of the large map.

When you have found the map sheet for your farm, you will notice that boundaries of the soils have been outlined in red, and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map.

Suppose you have found on your farm an area marked with the symbol Aa. You learn the name of the soil this symbol represents by looking at the map legend. The symbol Aa identifies Abernathy silt loam.

Learn about the soils on your farm

Abernathy silt loam and all the other soils mapped are described in the section, Descriptions of the Soils. Soil scientists walked over the fields and through the woodlands. They described and mapped the soils; dug holes and examined surface soils and subsoils; measured slopes with a hand level; noted differences in growth of crops, weeds, brush, or trees; and, in fact, recorded all the things about the soils that they believed might affect their suitability for farming.

After they mapped and studied the soils, the scientists judged what use and management each soil should have, and then they classified it in a land capability grouping. The land capability classification shows soils that are similar and that need and respond to about the same kind of management.

Abernathy silt loam is in capability unit I–1. Turn to the section, Use and Management of Soils, and read what is said about the soils of capability unit I–1. The table in the section, Estimated Yields, tells you how much you can expect to harvest from Abernathy silt loam under two levels of management. In columns A are yields to be expected under ordinary management; in columns B are yields to be expected under improved management.

Make a farm plan

Compare the yields and farm practices on your farm with those given in this report. Look at your fields for signs of runoff and erosion. Then decide whether or not you need to change your methods. The choice, of course, must be yours. This survey will aid you in planning new methods, but it is not a plan of management for your farm or any other farm in the county.

If you find that you need help in farm planning, consult the local representative of the Soil Conservation Service or the county agricultural agent. Members of the staff of your State agricultural experiment station and others familiar with farming in your county will also be glad to help you.

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Contents

 Issued September 1958

SOIL SURVEY OF DE KALB COUNTY, ALABAMA

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CORRELATION BY M. J. EDWARDS, SOIL SURVEY

UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES, THE ALABAMA AGRICULTURAL EXPERIMENT STATION, AND THE TENNESSEE VALLEY AUTHORITY

DE KALB COUNTY occupies a fairly high plateau that is divided by a narrow limestone lowland. This lowland area extends in a northeast-southwest direction near the middle of the county and consists of several limestone valleys separated by low ridges. The climate is favorable for many kinds of crops. Corn, cotton, and hay are the principal crops, but oats, wheat, potatoes, sweetpotatoes, and peas and beans for drying are also grown. Vegetables are produced commercially on some farms and for home use on nearly all farms. Livestock and livestock products and forest products are sources of income on many farms. Lumber and hosiery mills are located at Fort Payne. Various small mills are in other towns in the county. This cooperative soil survey was made by the United States Department of Agriculture, the Alabama Department of Agriculture and Industries, the Alabama Agricultural Experiment Station, and the Tennessee Valley Authority. Fieldwork for this survey was completed in 1951. Unless otherwise specifically indicated, all statements in this report refer to conditions in the county at that time.

General Character of the Area

Location and Extent

De Kalb County is in the northeastern corner of Alabama (fig. 1). It is bounded on the northwest by Jackson County; on the southeast by Cherokee County; on the south by Cherokee and Etowah Counties; and on the west by Marshall County. On the east-northeast, it is bounded by Dade, Walker, and Chattooga Counties, Ga. The longer axis of the county is more or less parallel to the general course of Big Wills Valley. De Kalb County has an area of approximately 778 square miles or 497,920 acres.

[1] R. C. Jurney, Soil Survey, assisted in writing the report.

[2] Fieldwork was done when Soil Survey was a part of the Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration. Soil Survey was transferred to the Soil Conservation Service on November 15, 1952.

[3] Numbers in italics refer to Literature Cited, p. 108.

Physiography

The county lies in both the Appalachian Plateau province (*3*)[3] and Ridge and Valley province of the Appalachian Highlands. Physiographically, the county

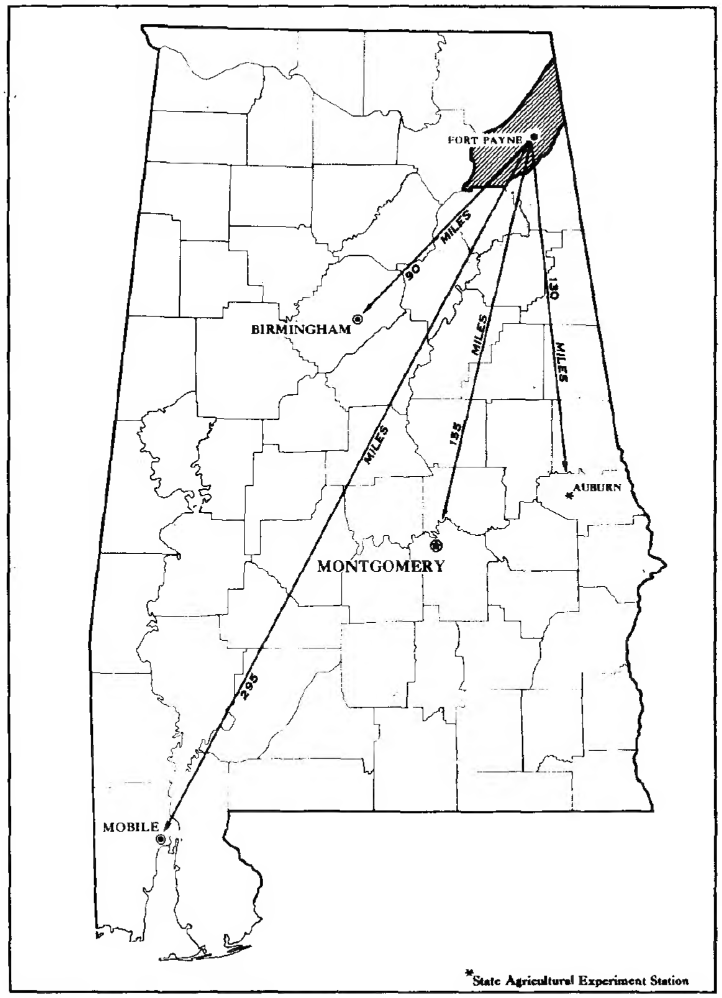

FIGURE 1.—Location of De Kalb County in Alabama.

is a high plateau divided by a limestone lowland consisting of a number of valleys separated by comparatively low ridges (fig. 2). In subsequent pages the plateau area is referred to as *sandstone plateaus,* and the ridge and valley area, as *limestone valleys.*

The plateau area was once a part of a nearly level continuous plain that extended from New York State into central Alabama. Lookout and Sand Mountains are remnants of this plain. The ridge and valley area has resulted from deterioration of comparatively soft rocks. Tremendous internal pressure from the shrinking of the earth's crust caused a sharp upward break, or fold, that extends in a nearly straight line in a northeasterly-southwesterly direction. The folded, or pushed-up, rock formations originally had the highest elevation; and the present sandstone plateaus, such as Lookout and Sand Mountains, the lowest. The broken surfaces in the folded areas exposed rock formations that were not resistant to erosion or dissolution. These processes have continued through the ages and have formed the present limestone valleys.

Sandstone plateaus.—The sandstone plateaus include Lookout, Sand, and Fox Mountains. They are capped by a sedimentary rock formation of sandstone and shale. Lookout Mountain is separated from the others by Big Wills Valley. Fox Mountain comprises only a small spur. It is partly separated from Sand Mountain by a relatively high limestone saddle.

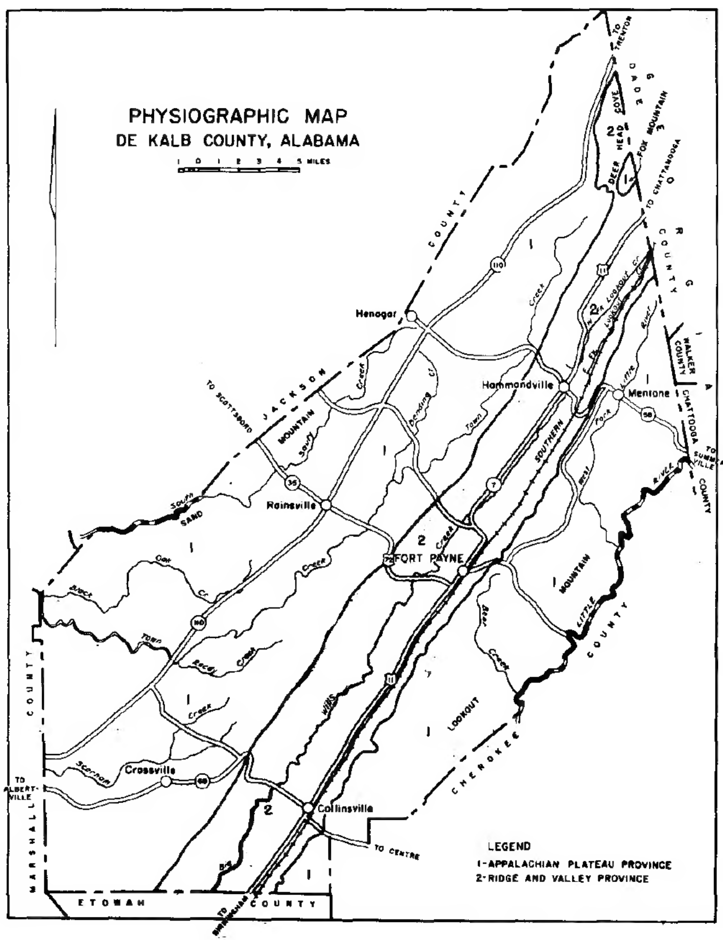

Figure 2.—Physiographic map of De Kalb County, Alabama.

Limestone valleys.—The limestone valleys include Big Wills Valley and Deer Head Cove. The exposed rock formations are limestone, shale, and calcareous sandstone. Big Wills Valley is divided into four narrow valleys, by three ridges. These ridges are fairly continuous except where cut here and there by stream passages. The names applied to them, however, do not appear to be used consistently throughout their extent.

The eastern ridge is very distinct. It continues from Etowah County northward nearly to the State line. In the southern and central parts it is known as Big Ridge, but in the northern end it generally is called Little Ridge.

The central ridge, or divide, consists of a wide, rough, hilly strip in the southern and central parts. It extends northward nearly to Hammondville, where it continues as a narrower and more definite ridge into Georgia. The southern part is called the middle ridges; but the northern part is known as Big Ridge and is thus confused with the eastern ridge that occurs farther south.

The western ridge is very narrow and sharp and is known as Shinbone Ridge in the southern part. Some call it Shinbone Ridge throughout its length, whereas others call it Little Ridge in the northern half. The northern part is thus confused with the eastern ridge, which also is called Little Ridge in its northern part. Shinbone Ridge starts just south of State Highway No. 68, or the Collinsville-Crossville Highway, and ends just south of Sulphur Springs.

The four narrow valleys into which Big Wills Valley is divided are generally known as Little Wills or Railroad Valley, Big Wills Valley, Dugout Valley, and Sand Valley. The eastern valley, known as Little Wills from Fort Payne southward and as Railroad Valley farther north, has an average width of about one-half mile. It extends from Etowah County northeastward through De Kalb County into Georgia. Just south of the Georgia boundary it joins West Fork Lookout Creek Valley, the northern counterpart of Big Wills Valley.

Big Wills is the east-central valley. It is the widest of the four valleys and extends from Etowah County northward to the drainage divide just north of Hammondville. From this divide it continues northward as West Fork Lookout Creek Valley. It becomes considerably narrower farther north, but widens again at its junction with Railroad Valley.

Dugout is the west-central valley. On the south it joins Sand Valley just south of State Highway No. 68. Dugout Valley is the narrowest of the four valleys and in places is almost nonexistent. It is wider toward the northern end, however, and continues into Georgia.

Sand Valley follows the foot slopes of Sand Mountain and is somewhat rolling to hilly in places. It is fairly uniform in width, although it generally narrows toward the southern part.

Deer Head Cove is separated from the other valleys in the county by Fox Mountain, which is a high sandstone plateau partly separated from Sand Mountain.

Relief

Areas in the limestone valleys and on the high sandstone plateaus are level to gently sloping. However, more than half of the area of the limestone valleys is

made up of hilly to steep ridges. The sandstone plateaus have mountainous slopes and deeply cut gorges. In places the gorges and mountain scarps have vertical to overhanging sandstone walls. Lookout Mountain in general is rougher and has more rolling to hilly relief than Sand Mountain, but both of these sandstone plateaus have rough as well as fairly smooth areas (fig. 3).

FIGURE 3.—View on Lookout Mountain showing the undulating to rolling sandstone plateaus and the very shallow to moderately deep soils.

The county has a general slope toward the southwest. Its highest point above sea level (1,980 feet) is on Fox Mountain.[4] The highest point on Sand Mountain is 1,960 feet, and on Lookout Mountain, 1,930 feet.

Elevations at scattered points on Sand Mountain range from 1,200 feet at Crossville to 1,610 feet at Beaty Crossroads. Elevations in the valley range from 708 feet at Collinsville to 990 feet at Hammondville. Low points in the valley are 625 feet at Big Wills Creek, at the De Kalb County line, and 710 feet at Little Wills Creek.

The eastern ridge in the limestone valleys is generally slightly higher than the middle and western ridges. For example, the eastern ridge at the drainage divide north of Valley Head is 1,300 feet; the middle ridge south of State Highway No. 35 is 1,040 feet; and the western ridge south of Chavies Gap ranges from 1,000 to 1,040 feet. The elevations are only slightly higher on the ridges at the drainage divide than north or south of the divide. In contrast, both Lookout Mountain and Sand Mountain descend from nearly 2,000 feet above sea level in the northern parts to 1,200 or less at the southern boundary of the county.

Drainage

The county lies partly in the drainage basin of the Tennessee River and partly in that of the Coosa River. Drainage from Sand Mountain and the valley north of the divide above Hammondville is into the Tennessee River. Drainage from Lookout Mountain and the valley south of the divide is into the Coosa River. Streams from Lookout Mountain drain mostly into the Little River and its tributaries. Exceptions are a few small basins along the western bluff that are drained locally into Little Wills Valley and a small area on the bluff south of Collinsville drained by tributaries of Black Creek. This creek eventually reaches the Coosa River through Little Wills and Big Wills Creeks. The deep gorges along Little River were cut when the river carried practically all of the runoff water from the high slopes that extended over what is now Wills Valley. The river follows the general slope of the Appalachian Plateau toward the southwest.

Big Wills Creek and its tributaries drain the valleys south of the drainage divide located just north of Valley Head and Hammondville. North of the divide, East Fork Lookout Creek drains Railroad Valley. West Fork Lookout Creek drains the east-central valley. The two forks join to form Lookout Creek. Dry Creek drains both Sand and Dugout Valleys. Its course lies in Dugout Valley, but its branches reach into Sand Valley. Deer Head Cove is drained by two branches of Lookout Creek, by Crawfish Creek in the northwest, and by Allison Creek in the southeast.

Sand Mountain is drained largely by Town Creek and its branches. Town Creek rises about 2 miles east of Ider. Short Creek and its branches drain the areas south of the Town Creek basin. The areas north and west of Town Creek basin are drained by branches of various creeks. Those areas in the vicinity of Ider and to the north are drained by Higdon, Miller, and Snake Creeks and by branches of Flat Rock Creek. In the central part the drainage is through Bryant Creek and its branches. South Sauty Creek and its branches drain the county south and west of Henagar.

Rocks

The rocks of De Kalb County are all sedimentary in origin, both those that are exposed and those that underlie the area to a very great depth. Only the rocks that are exposed or partly exposed on the surface by upheaval and erosion are of interest as far as soils of the county are concerned. The following geologic formations (*1*) are exposed within the county in the order named, starting with the uppermost:

Geologic formation:	*General characteristics*
Pottsville formation	Sandstone, conglomerate, and shale.
Bangor limestone	Bluish-gray, thick-bedded limestone.
Hartsells sandstone	Thick- and thin-bedded sandstone with shallow shale layer, if any.
Fort Payne chert	Dark flinty chert weathering to a light-gray porous chert; some shale.
Chattanooga shale	Dark carbonaceous shale.
Red Mountain formation	Bluish-red porous sandstone; red shale; gray shale; and fine-grained, greenish or gray, even-layered and rather thick sandstone.
Chickamauga limestone	Hard, dark bluish-gray limestone; apparently highly fossiliferous in places.
Limestone of the Beekmantown group.	Similar to Chickamauga limestone.
Chepultepec and Copper Ridge dolomites.	A chert-producing limestone or dolomite, the chert generally similar to that of Fort Payne chert.

Soils retain many characteristics inherited from the soil parent materials. These materials were derived from various geologic formations. Similar formations give rise to similar soil parent materials and consequently to similar soils. Only the more important

[4] Elevations from United States Geological Survey topographic maps.

formations exposed in De Kalb County will be discussed in detail.

The Pottsville formation is the most important in De Kalb County. It forms the capping on Lookout, Sand, and Fox Mountains and covers nearly four-fifths of the area. It is the only formation exposed on the sandstone plateaus, except in some of the deep gorges. In these gorges the streams have cut through the sandstone and shale layers into the underlying limestone formation. The Pottsville formation consists, or consisted, of beds of sandstone alternating with beds of shale. The uniformity and thickness of the beds vary greatly. In some places the sandstone beds appear to be relatively thin and the shale beds thick; in others the sandstone beds appear to be several times as thick as the shale. Lenses of shale may occur in the sandstone, or lenses of sandstone in the shale. Little Mountain, or Lookout Mountain, south of Mentone has a thin capping of sandstone. This is underlain by a relatively thick bed of shale that rests on another sandstone layer. Similar conditions occur on Pea Ridge of Sand Mountain. The variations appear to be greater on Lookout Mountain than on Sand Mountain.

The sandstone members of the Pottsville formation are quite resistant to weathering. The rock is composed largely of fine- to medium-grained, thick-bedded or massive sandstone. In some places, however, it is a thin-bedded fairly hard rock commonly called flagstone; in others it is composed largely of conglomerates. In a few places the rock has rather loose structure and is composed of nearly unconsolidated sandy material that can be broken readily into single-grain consistence. Locally, interbedded layers or lenses of soft clay shale occur in the sandstone. Partly indurated rather shallow beds of varicolored stratified or very thinly bedded clay, silt, and very fine sand are fairly common. These beds are about 2 to 6 feet thick and are generally underlain by sandy shale.

Some of the Pottsville shale beds that separate the sandstone strata are of nearly pure clay, and others are more or less sandy. In places the beds of clay shale contain one or more beds of mineable coal. A strip mine was in operation on Lookout Mountain from 1948 to 1950. Other small coal mines have been worked or are being worked on Lookout and Sand Mountains.

Sandstone and shale of the Pottsville formation have contributed parent materials for many of the soils of the county. From them have developed the parent materials of the Hartsells, Linker, Crossville, Apison, Muskingum, and Pottsville series, associated alluvial and colluvial series, and miscellaneous land types. Many of the soils in the limestone valleys are modified by both sandy and clayey material derived from the Pottsville formation.

Fort Payne chert and the Chepultepec and Copper Ridge dolomites probably are second in importance as the source of soil parent materials in this county. From these rocks come the soil parent materials of Clarksville, Fullerton, Minvale, Pace, Hermitage, Greendale, and other more or less cherty soils. Considerable material washed from the cherty areas, especially fine-textured material, has been added to the general alluvium deposited on flood plains. Soils derived from the shale member of the Fort Payne chert usually are classified with the Litz or with other soils derived largely from shale. Chert quarries for road material are common in both ridges of Fort Payne chert (fig. 4) and in the middle ridges derived from the dolomitic

FIGURE 4.—Fort Payne chert in a quarry northeast of Fort Payne.

limestones. Fort Payne chert occurs on the east slope of the eastern ridge and the northwestern slope of the western ridge. The chert from dolomitic limestone occurs in the middle ridges of the southern part of the county and in Big Ridge in the northern part.

The Red Mountain formation underlies the Fort Payne chert. It corresponds to the Tellico sandstone of Tennessee, Georgia, and other areas. It outcrops fairly regularly on the northwestern slope of the eastern ridge and more or less irregularly on the southeastern slope of the western ridge. The name Red Mountain comes from the red soil that covers the exposed areas. The formation varies considerably in thickness, but no exact measurements are available. Geologists have estimated that its maximum thickness in this area may approach 700 feet. Only a small part of the formation is red. The upper part consists largely of gray shale and green or gray thick-layered sandstone, usually fine grained. The lower part is mostly shale that contains some ferruginous seams. The red layers probably do not exceed 100 feet in thickness and may be absent in places. The red color is caused by staining by iron oxide derived from decayed or weathered iron ore and red sandstone.

The Red Mountain formation or other shaly formations are exposed only where they have a relatively strong dip. Consequently, the soil parent materials derived directly from these formations are not very extensive in the county. The dip in the eastern ridge is relatively mild as compared to that of the western ridge, where in places the formations are nearly perpendicular. The Sequoia, Litz, Tellico, and Muse series, and the included Alcoa and Neubert series, have formed from parent materials derived from, or largely from, weathered products of the sandstone and shale of the Red Mountain formation or other associated shaly formations.

Chickamauga limestone and the limestone of the Beekmantown group are similar and closely associated. Chickamauga limestone underlies the Red Mountain formation. Both of these limestones outcrop in Big Wills Valley and West Fork Lookout Creek Valley, or the east-central valley as a whole. Some parts outcrop in the northern part of Dry Creek Valley. These limestones are hard, bluish gray, and argillaceous. They are highly fossiliferous in some places and apparently

cherty in others. The argillaceous rock weathers to a reddish shaly mass. The residue of the weathered rock forms the parent soil material of the Colbert and Talbott series. In places, however, these series are derived also from materials of other limestone formations. Much of the weathered residue is washed directly or indirectly into the streams and is spread over the flood plains during periods of overflow. The alluvium is derived largely from weathered limestone. It is the parent material of Etowah, Capshaw, Tupelo, Robertsville, Dunning, and Melvin soils of alluvial origin in the limestone valleys.

Bangor limestone gives rise to extensive areas of Rockland, limestone, steep. This rockland is a miscellaneous land type that occurs mostly on lower slopes of Lookout Mountain.

Hartsells sandstone occurs in such small exposed areas that no soil series can be correlated and mapped with it.

Chattanooga shale occurs in exposures that are so intermittent and narrow that correlation with soil series is impractical. The soils in areas where this shale is exposed are included in mapping units of the Tellico series.

Climate

The climate of De Kalb County is continental (table 1). It is humid, mild, and temperate, but there is a fairly wide range in temperature over a period of years. The summers usually are long and have moderately hot days and fairly cool nights. In general the winters are mild and pleasant. The temperature frequently falls below freezing during the night and occasionally remains below freezing for 1 to 3 days or more.

Snow is not common. Usually the snow melts quickly, particularly in the limestone valleys, but at times the ground is covered for more than a week, especially on the sandstone plateaus.

At Valley Head the average date of the last killing frost in spring is April 12, and that of the first killing frost in fall is October 24. This is a frost-free period of 194 days. It is thought that the frost-free period is from 1 to 2 weeks shorter in the northern part on the sandstone plateaus than in the limestone valleys and southern parts of Lookout and Sand Mountains.

Ordinarily precipitation is fairly well distributed throughout the year in all parts of the county. Occasionally one part of the county may have too much moisture, whereas another part may have drought.

The climate is favorable to most farm crops generally grown in the county. Short periods of very dry or very wet weather are common, but severe droughts over long periods are rare. Damage to some crops from either too much moisture or too little moisture may occur in almost any year, but total loss of all crops in any one year has never occurred. Severe windstorms are few. Electrical storms are fairly common but are usually not damaging.

The winters are mild, and winter cover crops can be grown successfully. The long growing season permits a cover crop to be turned under after it has developed good growth in spring, and then another crop can be grown before killing frost in fall. Under well-managed pasture programs, grazing is available throughout most of the year. Because the ground is seldom frozen for long periods, seedbeds can be prepared in winter and early in spring if moisture conditions are favorable.

TABLE 1.—*Normal temperature and precipitation at Valley Head, De Kalb County, Ala.*

[Elevation, 1,030 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1954)	Wettest year (1900)	Average snowfall
	°F	°F	°F	Inches	Inches	Inches	Inches
December	42.5	78	0	5.17	6.47	4.20	0.8
January	40.9	78	−7	4.85	7.41	4.26	1.1
February	43.2	80	−18	4.84	4.19	7.72	.7
Winter	42.2	80	−18	14.86	18.07	16.18	2.6
March	50.7	90	4	5.65	4.10	6.59	.1
April	58.8	92	22	5.08	4.23	11.40	(3)
May	67.2	100	30	4.26	3.17	3.48	0
Spring	58.9	100	4	14.99	11.50	21.47	.1
June	74.8	104	36	4.29	1.37	12.47	0
July	77.3	106	49	5.01	.66	3.77	0
August	76.7	105	42	4.56	.41	4.29	0
Summer	76.3	106	36	13.86	2.44	20.53	0
September	72.3	104	30	2.55	.36	4.70	0
October	60.5	95	22	3.45	.92	7.28	(3)
November	49.4	82	10	3.16	2.63	4.29	.1
Fall	60.7	104	10	9.16	3.91	16.27	.1
Year	59.5	106	−18	52.87	35.92	74.45	2.8

[1] Average temperature based on a 70-year record, through 1954; highest and lowest temperatures on a 46-year record, through 1930.

[2] Average precipitation based on a 71-year record, through 1955; wettest and driest years based on a 64-year record, in the period 1886–1955; snowfall, based on a 41-year record, through 1930.

[3] Trace.

Water Supply

The supply of water for household use and for livestock is good in nearly all parts of the county. However, water veins with an ample supply have been somewhat difficult to strike in places in the limestone valleys and on the sandstone plateaus. Occasionally in limestone valleys the water has undesirable qualities. The wells are about 35 to more than 125 feet deep. Shallower wells formerly were common, but they have not withstood the dry periods of later years.

The early settlers usually built homes within short distances of natural springs. Many of the later settlers, however, found it necessary to sink wells—usually shallow ones. Many of the springs first used are still flowing, others have dried up, and some yield water poorly suited to household use. In later years some farmers have constructed small ponds or tanks for supplementing their water supply for livestock during

dry periods. This practice is not common, although many small fishponds have been built.

Until recently most of the wells were dug to depths of 10 to 50 feet or more. It is now estimated that more drilled wells are in use than open dug wells. When an old well becomes inadequate, it usually is replaced by a drilled well. Pipe casing, however, is installed in some old wells, which are drilled to a depth where the water supply is greater. Creeks or small drains supply most of the water for livestock.

Vegetation

The original cover of De Kalb County was largely forest and some underbrush and small patches of grass, lichen, shrubs, annual plants, and perennial plants. There is very little information about the composition of the original forest. Probably most areas could have been classed as mixed hardwoods and pine. In the limestone valleys, nearly level to rolling areas with limestone outcrops and very shallow soils over limestone had almost pure stands of redcedar. On the sandstone plateaus, areas of shallow soils over sandstone and those with sandstone outcrops supported nearly solid stands of Virginia pine *(Pinus virginiana)*.

Practically every kind of tree common to forested areas of the county today was cited as witness trees to established land corners. The following is a fairly complete list of names from compiled field notes of the United States Original Land Surveys: Beech, black oak, black gum, blackjack oak, chestnut, chestnut oak, chinquapin, dogwood, elm, hickory, lynn, maple, persimmon, pine, poplar, post oak, red oak, sassafras, sourwood, Spanish oak, sweetgum, sycamore, walnut, white oak, and willow. Post and black oaks were named most often as witness trees and probably were dominant. Other common trees were water oak, laurel oak, ironwood, birch, hawthorn, redbud, hackberry, sumac, honey or sweet locust, black locust, buckeye, and holly. The locust trees are not native to the area.

The trees now growing in the county are about the same species as those of the original forest. A higher percentage of pine is probably present because pine reseeds voluntarily on abandoned fields or on cutover areas, pasture, and burned-over forest. Virginia pine *(Pinus virginiana)*, commonly called scrub pine or spruce pine, loblolly pine *(P. taeda)*, and shortleaf pine *(P. echinata)* are the most common pines in the county. Virginia pine is largely on the sandstone plateaus where the soil is comparatively shallow to bedrock, but the other two species grow in the limestone valleys and on the sandstone plateaus in areas with relatively deep soil. Some of each kind, however, are in areas dominated by the other species.

Grape, muscadine, rattan, and ivies, together with blackberry, greenbrier, sawbrier, and other prickly vines and shrubs, entangle the densely wooded areas as well as the more open lands. Flowering plants native to this area are dogwood, hawthorn, mountain-laurel, rhododendron, honeysuckle, azalea, redbud, and wild crabapple. Wild rhododendron is featured at De Soto State Park, usually in May.

The local State forester reports that during the planting seasons of 1951 and 1952, 84,000 loblolly pine, 1,500 black locust, and 1,500 redcedar seedlings were planted in the county.

De Soto State Park contains 4,500 acres; about 100 acres of this total are not forested. During 1947 and 1948, 500,000 board-feet of timber (mainly *Pinus virginiana*) were marked for cutting in the park.

Wildlife

The settlers found an abundance of game and fish. Deer and turkey were common, as well as raccoon, opossum, squirrel, and rabbit. Quail, grouse, and other edible birds were plentiful. Bears, panthers, and wolves were destructive at times.

The game animals and birds most common at the present time are squirrel, rabbit, quail, and mourning dove. A game refuge has been established on the northern and eastern parts of Lookout Mountain, including the De Soto State Park area, which adjoins a game refuge in Georgia across the State line. It is hoped to reestablish deer and turkey in the large timbered areas of this region. The most common fur-bearing and predatory animals are raccoon, opossum, fox, bobcat, skunk, weasel, and probably a few coyotes. Fair to good fishing can be had at times in Little River and its branches on Lookout Mountain; in Big Wills and other creeks in the valleys; and in Town Creek and other streams on Sand Mountain. Most of the fishermen of De Kalb County, however, go to Guntersville Reservoir and other backwaters on the Tennessee River.

Early History

About the time the American colonies were becoming established, the Cherokee Nation of Indians claimed the land of Virginia and the Carolinas from the Atlantic to the Appalachian Mountains. As early as 1623 the Indians were driven from their homes along the Appomattox River in Virginia. From time to time they were driven westward until many crossed the mountains and settled in the valleys along the hills of what is now northwestern Georgia, northeastern Alabama, and eastern Tennessee.

Before the Revolutionary War, Big Will, an Indian chief who was part white, established Willstown (or Wills Town) near a stream now known as Big Wills Creek in the valley. The valley is also known as Big Wills. This settlement is supposed to have been made about 1770 on a site approximately 2 miles north of Lebanon or 5 or 6 miles southwest of Fort Payne. Some claim, however, that the site is about 2 miles north of Fort Payne. Willstown was one of the largest of the Cherokee settlements. At times during the Revolutionary War it was the headquarters for British agents who came to incite the Indians against the settlers of the southern colonies.

White people came into this region of the Cherokee country very early, probably as traders. Sequoyah, a son of one of the traders and a Cherokee woman, grew to manhood in this area. He developed a set of 86 characters for recording the Cherokee language. Except for the letter "S" each character expressed a complete

syllable. It is reported that newspapers, Bibles, and other publications were printed in the Cherokee language on presses set up in the Cherokee Nation. Before the settlers came, the Indians operated several cotton gins and gristmills which were turned by waterpower.

From colonial times, white settlers had encroached on Indian land, and new settlers had pushed farther inland. When they reached the region around De Kalb is not known definitely, but the date probably was some time after 1800.

The Indian history of this area is tied up with the history of the Cherokee Nation. In 1785 the Cherokees signed their first treaty with the newly formed United States Government. During the next 30 years new treaties were made from time to time, only to be broken by the settlers. In 1817 the Indians were forced to sign a treaty approved by President Thomas Jefferson, which provided for the removal of the Cherokees from the Great Smokies to the Indian Territory, now a part of Oklahoma. This was the forerunner of the Treaty of New Echota, signed December 29, 1835, which provided for the removal of the southern Cherokee Indians then concentrated mainly in northwestern Georgia, northeastern Alabama, and southeastern Tennessee. A few of the Indians, about 300 whose leaders had agreed to the treaty, migrated in 1836 to their new lands west of the Mississippi. The majority, about 18,000, whose leaders did not sign the treaty, refused to go. They were forcibly removed in 1838.

Organization and Population

De Kalb County was created by the Alabama State Legislature on January 9, 1836, a few days after the Treaty of New Echota was signed. It is one of three counties in Alabama formed from lands ceded by the Cherokee Indians under that treaty. It was named for Baron Johann De Kalb, a Bavarian officer who trained in the Army of France and accompanied General LaFayette to America. He was killed in South Carolina on August 16, 1780, in the Battle of Camden.

Local histories would indicate that from 1836 to 1842 the county seat was moved several times. Camden, a community about 2 miles southwest of Lebanon, was selected as the first county seat. It was named for Camden, S. C., where Baron De Kalb was killed. Fort Payne is the present county seat.

The people who settled De Kalb County came largely from Georgia and Tennessee and other counties already settled in Alabama. Some came directly from Virginia and the Carolinas, and many of those from nearby areas originally had been Virginians and Carolinians.

Practically all the settlers located in the limestone valleys, where the land was productive and communications and travel were less difficult. The soils of Lookout and Sand Mountains were severely leached, inherently not fertile, and not productive under natural conditions.

According to the Federal census, the population of De Kalb County was 5,929 in 1840, and by 1850 it had increased to 8,245. The population for the most part has shown a steady increase over the years. In 1950 the census reported a population of 45,048. The number of people classed as urban was 6,226.

Industries

The county is more than half in forest, and lumbering is one of its chief industries. Fort Payne is the main industrial center. According to the local Chamber of Commerce, 9 hosiery mills with 1,793 employees and 1 lumber fabrication company with 230 employees operate in Fort Payne. The lumber fabrication company specializes in building prefabricated houses and maintains sales in many parts of the country. Sawmills, planing mills, and lumberyards are located in Fort Payne and throughout the county. There is one small hosiery mill in Crossville. Various small mills are in operation in other towns in the county.

Thinly bedded sandstone for building rock has been quarried in several parts of the county. Suitable rock in any one area generally is small, and the supply in each quarry is soon exhausted. A few small coal mines have been operated on Lookout and Sand Mountains from time to time, but no regular mining is conducted. Sirup is made in small sorghum mills throughout the county, and the 1950 census states that 18,417 gallons were manufactured in 1949. Some limestone is quarried for road material. It is also suitable for agricultural use.

According to local information, about 40 cotton gins were operated during the ginning season of 1951 within the county. A few gins are located in neighboring counties, and it is probable that most farmers live within 5 miles of a cotton gin. All milk produced on farms for market is collected by motortruck and is processed outside the county.

Transportation

De Kalb County has connections with outside centers of population and markets by the Alabama Great Southern Railroad, which follows the eastern valley through the county. This railroad had its beginning about 1850 and is now a part of the Southern Railway System. The county has no scheduled air service. Several bus and motortruck lines connect with places outside the county.

There are several highways in the county. United States Highway No. 11 more or less parallels the railroad through the valley. State Highway No. 35 runs west from Fort Payne to Scottsboro. State Highway No. 68 runs west from Collinsville through Crossville to join State Highway No. 110, which traverses the entire length of Sand Mountain in De Kalb County and runs southwest from the Georgia State line to Albertville. State Highway No. 58 runs east from Hammondville through Valley Head and Mentone toward Summerville, Ga. In addition, several paved county roads and many gravel or dirt roads are maintained. Transportation facilities have improved greatly within recent years.

As reported by the 1950 Federal census, 1,012 farms were located on hard-surfaced roads; 876 on gravel, shell, or shale roads; and 4,842 on dirt or unimproved roads.

Farm to market facilities are in practically all parts of the county. In 1950 the average distance to the trading center visited most frequently was 4 miles. The farms located on dirt or unimproved roads reported

an average distance of 2 miles to the trading center visited most often.

Community, Farm, and Home Facilities

The county has a consolidated public school system consisting of 9 senior high schools and 22 elementary and junior high schools. Fort Payne has 2 elementary schools and 2 junior high schools. The 9 senior high schools are located in Fort Payne, Valley Head, Collinsville, Crossville, Geraldine, Fyffe, Sylvania, and Ider. Most of the pupils are transported to and from school by county school buses.

De Kalb General Hospital was opened in August 1950. It is located in Fort Payne and serves the entire county. Small clinics are in some of the larger towns.

Churches are well distributed throughout the county. The De Kalb County public library is in Fort Payne. It is a circulating library and maintains branches at 18 schools and substations. Rural mail routes extend into nearly all parts of the county.

As reported by the 1950 Federal census, electricity was available on 5,976 farms, and 750 farms had telephones. In 1950, 60 farms had milking machines, 1,228 had electric water pumps, 370 had electric chick brooders, and 30 had electric power feed grinders. In the same year, 574 farm homes had electric hot-water heaters, 183 had home freezers, and 3,990 had electric washing machines.

Agriculture

History

The people of De Kalb County have depended largely on agriculture, directly or indirectly, since the area was opened to settlers. Their agriculture did not differ greatly from that of the Indians who had grown corn, beans, peas, squash, and some other vegetables. The Indians also grew some cotton for spinning and weaving and raised cattle and hogs on open ranges. The Indian methods and tools for tilling the soil were crude, but these were ample for their needs. Their products were divided largely on a tribal or communal basis, especially the cattle and hogs, and probably the flour and meal from their gristmills and the lint from their primitive cotton gins.

The early settlers raised the same kinds of vegetables and other crops as the Indians, although improved varieties were introduced from time to time. The chief improvement in agriculture was in the methods of clearing and tilling the soil. Larger areas were opened for cultivation and, in time, plows and other implements for breaking and working the soil were employed. Oxen and horses were the principal work stock.

Corn was a major source of income from the early days. As transportation facilities improved, other marketable or cash crops, especially cotton, were introduced.

Land Use

According to the Federal census, 79.4 percent, or 395,556 acres, of the county was in farms in 1950. The farmland, by use in 1949, and the number of farms reporting, are given below:

Use:	*Acres*	*Farms reporting*
Cropland (total)	202,927	6,958
Harvested	173,524	6,640
Used only for pasture	13,180	5,272
Not harvested or pastured	16,223	1,729
Woodland (total)	153,999	5,184
Pastured	36,511	3,339
Not pastured	117,488	4,209
Other land pastured	24,474	3,222
Other land	14,156	6,292

Cropland used only for pasture includes rotation pasture and all other cropland used only for pasture. Cropland not harvested and not pastured includes idle cropland, land in soil-improvement crops only, land on which all crops failed, land seeded to crops for harvest after 1949, and cultivated summer fallow. Other land pastured includes rough and brush land and any other pastured land not classed either as woodland or as cropland. Other land includes house lots, barn lots, lanes, roads, ditches, and wasteland.

Number and Size of Farms

As reported by the Federal census, the number of farms in the county in 1950 was 7,055 and the average size of farms was 56.1 acres.

The farms of the county, classified in the 1950 Federal census by size, and the number and acreage in each classification, are given below:

Size of farms in acres:	*Number*	*Total acreage*
Under 10	383	1,988
10 to 69	4,957	184,133
70 to 179	1,511	146,874
180 to 499	184	45,995
500 and larger	20	16,566

The number and size of farms reported by the census are based on operational units and not on ownership. The trend in land ownership from small to large farms, or conversely, therefore, is not easily determined. However, there is apparently a trend toward larger units because of the increase in livestock raising, especially in the limestone valleys.

Types of Farms

The number of farms by type of farm, as compiled from the 1950 Federal census, are as follows:

Type of farm:	*Number*
Field crop other than vegetable and fruit-and-nut	4,415
Cash-grain	92
Cotton	4,328
Other field-crop	25
Vegetable	15
Fruit-and-nut	5
Dairy	52
Poultry	111
Livestock other than dairy and poultry	131
General	459
Primarily crop	172
Primarily livestock	45
Crop and livestock	242
Miscellaneous and unclassified	1,837

Crops

De Kalb is one of the leading counties in the State in the production of corn and cotton. This leading position is the result of increased knowledge and use of better farm-management practices. These practices were developed mainly at the Sand Mountain Substation at Crossville for the relatively infertile but responsive soils of Sand and Lookout Mountains. A fairly large acreage of hay is grown. Oats, wheat, peas and beans for drying, potatoes, and sweetpotatoes are grown on a relatively small scale. Vegetables are produced for home use on nearly all farms, and for market on some.

From about 1900 until recently, apples and peaches were grown commercially in De Kalb County. Control of diseases and pests, however, has been too difficult and costly for the commercial grower and is prohibitive for the home orchardist. Strawberries and other small fruits are grown commercially on a few farms on the sandstone plateaus. The largest center at present is near Henagar.

The acreage of the principal crops and the number of bearing fruit and nut trees and grapevines, compiled from Federal census reports for the years stated, are given in table 2.

TABLE 2.—*Acreage of principal crops and number of fruit and nut trees and grapevines of bearing age in stated years*

Crops	1929	1939	1949
	Acres	*Acres*	*Acres*
Corn harvested for grain	65,205	97,852	86,347
Oats threshed or combined	18	120	483
Wheat threshed	57	107	94
Cowpeas harvested for peas	(1)	1,849	107
Soybeans harvested for beans	(1)	312	66
Peanuts	(1)	402	37
All hay	12,556	25,941	15,550
Timothy or clover, alone or mixed	254	81	263
Alfalfa	1	49	1,452
Other cultivated grasses	837	909	397
Wild grasses	232	170	(1)
Grains cut green	154	171	936
Legumes cut for hay	11,078	23,431	[2] 8,710
Lespedeza	(1)	1,130	3,792
Potatoes	1,007	1,762	[3] 1,570
Sweetpotatoes and yams	790	1,154	[3] 150
All other vegetables [4]	203	381	884
Cotton	79,137	42,708	64,112
Strawberries	33	21	(1)
	Number	*Number*	*Number*
Apple trees	65,343	47,937	26,743
Peach trees	53,779	51,840	19,711
Pear trees	3,029	3,206	1,232
Plum and prune trees	1,674	1,404	673
Cherry trees	2,314	3,283	939
Fig trees	42	118	564
Pecan trees	238	316	1,025
Grapevines	7,778	13,058	6,780

[1] Not available.
[2] Soybeans and cowpeas grown alone or with other crops for hay.
[3] Does not include acres for farms with less than 15 bushels harvested.
[4] Harvested for sale.

Livestock and Livestock Products

The livestock industry—the raising o ttle, hogs, and poultry—and the dairy industr eas- ingly important to the economy of the county. Great improvement has been made in recent years in quality of beef and dairy cattle as well as in the efficiency of farm management.

Beef-cattle raising is confined largely to the limestone valleys. Dairy farms are on some of the sandstone plateaus and in the limestone valleys. Hog raising is common on the sandstone plateaus and in the limestone valleys, but more animals per farm are kept on the sandstone plateaus.

Poultry flocks are small. Specialized poultry farms are mostly on the sandstone plateaus. Some farms produce eggs for market, but the greater number supply eggs for hatcheries under contract. Other poultry farms specialize in raising broilers.

As reported by the 1950 Federal census, livestock and livestock products were a major source of income on 294 farms. In the same year dairy products were sold from 1,651 farms. On the day preceding the census enumeration 7,859 cows were milked on 5,585 farms; they produced 18,066 gallons of milk. Many farms in the county reported sale of livestock or livestock products. These sales included 6,059 cattle and calves sold alive and 319 butchered, and 18,007 hogs and pigs sold alive and 10,161 butchered. Also reported sold were 110 sheep and lambs, 433 horses and mules, 183,543 chickens, and 782,935 dozen eggs.

Table 3 gives the number of livestock and beehives on farms of the county for stated years, as compiled from Federal census reports.

TABLE 3.—*Number of livestock and beehives on farms in stated years*

Livestock	1930	1940	1950
	Number	*Number*	*Number*
Mules and mule colts	[1] 8,972	[1] 8,703	8,206
Horses and colts	[1] 1,667	[1] 2,227	[2] 2,385
Cattle and calves	13,438	[1] 13,680	19,497
Hogs and pigs	6,848	[3] 9,197	22,194
Sheep and lambs	375	[4] 307	284
Chickens	[1] 169,902	[3] 234,306	[3] 258,566
Beehives	1,955	1,087	2,226

[1] Over 3 months old.
[2] Includes ponies.
[3] Over 4 months old.
[4] Over 6 months old.

Forest Products

Forest products are a source of income in the county. Standing timber was sold on 234 farms in 1949, as reported by the 1950 Federal census. Firewood was cut on a third of the farms. Fence posts, sawlogs, veneer logs, pulpwood, pilings, and poles were cut to a lesser extent.

Farm Power and Mechanical Equipment

Although the number of tractors has increased greatly, the number of horses and mules remained fairly constant during the 20-year period from 1930 to 1950. Horses and mules, however, are turned out to pasture more often and for longer periods than when they were the sole source of power.

The 1950 Federal census reports mechanical equipment on farms, as follows:

Mechanical equipment on farms:	*Number*	*Farms reporting*
Tractors	1,247	1,179
Motortrucks	1,565	1,459
Automobiles	2,088	1,980
Grain combines	43	43
Corn pickers	16	16
Pick-up hay balers	31	31

The farms are classified according to work power in 1950 as follows:

Farms classified by work power:	*Number*
No tractor, horses, or mules	1,387
No tractor and 1 horse or mule	839
No tractor and 2 or more horses, mules, or both	3,646
Tractor and horses, mules, or both	606
Tractor and no horses and mules	577

Farm Tenure and Labor

On the basis of the 1950 Federal census, full owners operated 3,666 farms, or 52 percent of the farms in the county; part owners 879, or 12.4 percent; and tenants 2,507, or 35.5 percent. Tenancy decreased from 41.7 percent in 1945. Managers operated only 3 farms.

Tenants on farms in 1950 were as follows:

Tenants on farms:	*Number*
Cash	71
Share-cash	12
Share	1,841
Croppers	409
Other and unspecified	174

The kinds of farm operators and the acreage operated by each were as follows:

Kinds of farm operators:	*Acres*
Full owners	214,509
Part owners	57,123
Managers	3,071
All tenants	120,853
Cash	3,364
Share-cash	486
Share	92,136
Croppers	16,165
Other and unspecified	8,702

In 1950 the number of farm operators residing on farm was 6,291; not residing on farm operated, 78; with other income of family in 1949 exceeding value of agricultural products sold, 1,563; and working off their farm, 1,707.

Farm Expenditures

Of the 7,055 farms in the county, 6,056 reported farm expenditures in 1949. According to the 1950 census the expenditures and the number of farms making them were as follows:

Expenditure for:	*Farms reporting*
Machine hire, hired labor, or both	4,634
Machine hire	4,173
Hired labor	2,338
Feed for livestock and poultry	3,433
Livestock and poultry purchased	2,502
Seeds, bulbs, plants, and trees purchased	3,804
Gasoline and other petroleum fuel and oil	1,556
Tractor repairs	714
Other farm machinery repairs	3,229

Soil Survey Methods and Definitions

The scientist who makes a soil survey examines soils in the field, classifies the soils in accordance with facts that he observes, and maps their boundaries on an aerial photograph or other map.

FIELD STUDY.—The soil surveyor bores or digs many holes to see what the soils are like. The holes are not spaced in a regular pattern, but are located according to the lay of the land. Usually they are not more than a quarter of a mile apart and sometimes they are much closer. In most soils such a boring or hole reveals several distinct layers, called horizons, which collectively are known as the soil profile. Each layer is studied to see how it differs from others in the profile and to learn the things about this soil that influence its capacity to support plant growth.

Color is usually related to the amount of organic matter. The darker the surface soil, as a rule, the more organic matter it contains. Streaks and spots of gray, yellow, and brown in the lower layers generally indicate poor drainage and poor aeration.

Texture, or the content of sand, silt, and clay, is determined by the way the soil feels when rubbed between the fingers and is later checked by laboratory analysis. Texture determines how well the soil retains moisture, plant nutrients, and fertilizer, and whether it is easy or difficult to cultivate.

Structure, which is the way the individual soil particles are arranged in larger grains and the amount of pore space between grains, gives us clues to the ease or difficulty with which the soil is penetrated by plant roots and by moisture.

Consistence, or the tendency of the soil to crumble or to stick together, indicates whether it is easy or difficult to keep the soil open and porous under cultivation.

Slope was taken into consideration in the mapping of the various soils of the county. The slope classification used is as follows: Nearly level, undulating, rolling, hilly, and steep. In De Kalb County the nearly level soils do not have the phase name added. The slope classification and percentage range for the slope phases of the Apison, Crossville, Hartsells, Linker, Muskingum, and Pottsville soils are as follows:

Slope classes:	*Percent*		*Percent*
Nearly level	0–2	Hilly	10–20
Undulating	2–5	Steep	20 or more
Rolling	5–10		

The slope classification and percentage range for all other soils in the county are as follows:

Slope classes:	Percent		Percent
Nearly level	0–2	Hilly	12–25
Undulating	2–5	Steep	25 or more
Rolling	5–12		

Other characteristics observed in the course of the field study and considered in classifying the soil include the following: The depth of the soil over bedrock or compact layers; the presence of gravel or stones in amounts that will interfere with cultivation; the degree of erosion; the nature of the underlying rocks or other parent material from which the soil has developed; and acidity or alkalinity of the soil as measured by chemical tests. Many definitions of soil characteristics are given in the glossary, p. 106.

CLASSIFICATION.—On the basis of the characteristics observed by the survey team or determined by laboratory tests, soils are classified into phases, types, and series. The soil type is the basic classification unit. A soil type may consist of several phases. Types that resemble each other in most of their characteristics are grouped into soil series.

Soil type.—Soils similar in kind, thickness, and arrangement of soil layers are classified as one soil type.

Soil phase.—Because of differences other than those of kind, thickness, and arrangement of layers, some soil types are divided into two or more phases. Slope variations, frequency of rock outcrops, degree of erosion, depth of soil over the substratum, or natural drainage, are examples of characteristics that suggest dividing a soil type into phases.

The soil phase (or the soil type if it has not been subdivided) is the unit shown on the soil map. It is the unit that has the narrowest range of characteristics. Use and management practices, therefore, can be specified more easily than for soil series or yet broader groups that contain more variation. One can say, for example, that soils of the Muse series need lime for alfalfa but that Muse silt loam, eroded undulating phase, has gentle slopes and, in addition to needing lime, is suited to row crops in a rotation with small grain and hay. On the contrary, Muse silty clay loam, severely eroded rolling phase, has slopes that fall 5 to 12 feet in each 100 feet, is only fairly easy to work with heavy machinery, erodes easily, and should be used chiefly for hay or pasture.

Soil series.—Two or more soil types that differ in surface texture, but are otherwise similar in kind, thickness, and arrangement of soil layers, are normally designated as a soil series. In a given area, however, it frequently happens that a soil series is represented by only one soil type. Each series is named for a place near which the soil was first mapped.

As an example of soil classification, consider the Muse series of De Kalb County. This series is made up of two soil types, subdivided into phases as follows:

Series	*Type*	*Phase*
Muse	Silt loam	Eroded undulating phase.
		Eroded rolling phase.
	Silty clay loam	Severely eroded rolling phase.

Miscellaneous land types.—Bare rocky mountainsides, rough gullied land, and other areas that have little true soil are not classified into types and series; they are identified by descriptive names, such as Stony colluvial land, Gullied land, and Rockland.

Soil complex.—When two or more soils are so intricately associated in small areas that it is not feasible to show them separately on the soil map, they are mapped together and called a soil complex. Cotaco-Barbourville loams is a complex of Cotaco loam and Barbourville loam.

The Soils of De Kalb County

Soil Series and Their Relations

The soil types of the county have been classified in 44 series on the basis of differences in characteristics. To show their relations more clearly, the series are placed in four groups, according to their position on the landscape: (1) Soils of the uplands, (2) soils of colluvial lands, (3) soils of terraces, and (4) soils of bottom lands.

Soils of the uplands lie above the adjacent stream bottoms and were derived directly from the decomposition or dissolution of underlying rock. Soils of the colluvial lands were formed from soil materials washed from adjacent areas and deposited at the foot of slopes, along intermittent drainageways, and in depressions. Soils of the terraces consist of waterborne material and roughly occupy positions between bottom lands and uplands. Soils of the bottom lands, or flood plains, occupy level or nearly level areas adjacent to streams. They were derived from accumulations of water-deposited materials and are subject to flooding.

The soil series, land features, and principal characteristics of each series are shown in table 4.

In addition to the 44 soil series, 7 miscellaneous land types are mapped. These land types are as follows:

Gullied land	Stony smooth land, Talbott and Colbert soil materials
Rockland, limestone, steep	
Rockland, sandstone, steep	Stony rolling land, Talbott and Colbert soil materials
Rockland, sandstone, rolling	Stony colluvial land, steep

Genetic Classification of Soils

The soil series of this county, classified by soil orders and great soil groups (*6*), are shown in table 5. The principal factors that have influenced their formation are parent material, relief or lay of the land, and time. There are no great variations in the other two major soil-forming factors, which are climate and vegetation. Degree of profile development, given in the last two columns of table 5, suggests the relative time in which soil development has been taking place.

Descriptions of the Soils

In the following pages the soils of De Kalb County, identified by the same symbols used on the soil map, are described in detail. Their use and suitability is discussed, and the capability unit of each soil is given. Land capability classification is discussed in the section Use and Management of Soils. The acreage and proportionate extent of the soils are given in table 6, and their location and distribution are shown on the soil map in the back of this report.

TABLE 4.—*Principal characteristics*

Series	Parent material	Slope	Position	Natural drainage	Surface soil: Color	Surface soil: Approximate thickness
		Percent				*Inches*
Abernathy	Recent colluvium and local alluvium originating from limestone.	0–5	Colluvial slopes.	Well drained to moderately well drained.	Dark brown	14
Allen	Old colluvium and local alluvium originating mainly from sandstone but contains materials from limestone and shale.	2–25	Colluvial slopes.	Well drained to somewhat excessively drained.	Yellowish brown and strong brown through yellowish red to reddish brown and red.	5–8
Apison	Residuum from weathering of interbedded sandstone and shale, sandy shale, and siltstone.	2–10	Upland	Well drained	Yellowish brown to brownish yellow.	5–9
Atkins	Recent general alluvium from uplands underlain mainly by acid sandstone and shale.	0–2	Bottom land.	Poorly drained	Dark gray to very dark gray in the upper part; gray to dark grayish brown in the lower part.	10
Barbourville [3]	Recent colluvium and local alluvium originating from acid sandstone and shale.	1–3	Colluvial slopes.	Well drained to moderately well drained.	Brown to yellowish brown	8
Capshaw	Old mixed general alluvium from uplands underlain mainly by limestone but in places by sandstone and shale.	0–5	Terraces	Moderately well drained	Light yellowish brown to yellowish brown.	8
Clarksville	Residuum from weathering of— Very cherty dolomitic limestone	5–45	Upland	Well drained to excessively drained.	Light gray, light brownish gray, or pale yellow to light yellowish brown.	5–7
Colbert	Clayey (argillaceous) limestone that contains shale beds in places.	2–12	Upland	Somewhat poorly drained to moderately well drained.	Olive brown to light yellowish brown or yellowish brown.	5
Cotaco [4]	Recent colluvium and local alluvium originating from acid sandstone and shale.	1–3	Colluvial slopes.	Same	Dark gray to grayish brown	10
Crossville	Residuum from weathering of— Fine-grained sandstone, conglomerate, and interbedded shale.	2–10	Upland	Well drained to moderately well drained.	Dark brown to dark reddish brown in the upper part; dark reddish brown in the lower part.	9–11
Dewey	High-grade limestone that contains some chert in places.	5–25	Upland	Well drained to somewhat excessively drained.	Brown to reddish brown	5
Dunning	Recent general alluvium from uplands underlain mainly by limestone.	0–2	Bottom land.	Poorly drained	Dark grayish brown to olive brown.	7
Dowellton	Residuum from weathering of highly clayey (argillaceous) limestone and calcareous clay shale.	0–2	Upland	Somewhat poorly drained to moderately well drained.	Brown to pale brown	5
Ennis	Recent general alluvium from uplands underlain mainly by chert or cherty limestone and cherty dolomite.	0–2	Bottom land.	Moderately well drained	Brown	10
Etowah	Old mixed general alluvium from uplands underlain mainly by limestone but in places by sandstone and shale.	2–5	Terraces	Well drained	Dark brown	7
Fullerton	Residuum from weathering of cherty dolomitic limestone.	5–25	Upland	Well drained to excessively drained.	Grayish brown or yellowish brown to yellowish red.	5–8
Greendale	Recent colluvium and local alluvium originating from chert or cherty limestone.	0–6	Colluvial slopes.	Well drained to moderately well drained.	Grayish brown	8
Hamblen [5]	Recent local alluvium and colluvium from uplands underlain by acid sandstone and shale and calcareous rocks.	0–2	Bottom land.	Somewhat poorly drained	Brown to dark grayish brown	20
Hartsells	Residuum from weathering of sandstone and conglomerate, with beds of acid shale in places.	2–10	Upland	Well drained	Grayish brown to brownish yellow, or pale brown to brownish yellow.	5–11
Hermitage	Old colluvium and local alluvium originating mainly from high-grade limestone.	2–12	Colluvial slopes.	Well drained to somewhat excessively drained.	Dark brown to dark reddish brown, or reddish brown.	5–8

See footnotes at end of table.

Subsoil				
Color	Consistence	Texture	Approximate thickness	Soil depth[1]
			Inches	
Brown to reddish brown[2]	Friable	Silty clay loam	14	Very deep.
Red or reddish brown	Friable	Clay loam or stony clay loam	6 23	Shallow to very deep.
Brownish yellow to yellowish brown in the upper part; mottled brown, yellowish brown, yellow, reddish yellow, and gray in the lower part.	Friable in the upper part; firm to friable in the lower part.	Silty clay or silty clay loam in the upper part; silty clay in the lower part.	24–27	Shallow to deep.
Grayish brown (when wet) faintly mottled with shades of yellow, brown, and gray; light brownish gray (when moist) distinctly mottled with brown and brownish yellow.	Sticky when wet; firm when moist.	Silty clay loam	20	Deep to very deep.
Grayish brown, brown, or yellowish brown[2]	Friable	Heavy loam to sandy clay loam	12	Shallow to very deep.
Yellowish brown to grayish brown in the upper part; yellowish brown to yellow in the lower part.	Friable	Silty clay loam to silty clay in the upper part; silty clay in the lower part.	20	Deep to very deep.
Pale yellow to light yellowish brown	Friable	Cherty silty clay loam to cherty clay.	21–23	Very deep.
Yellowish brown	Very firm, tight	Silty clay	10–13	Very shallow to deep.
Splotched or mottled with shades of grayish brown and yellow[2].	Friable	Loam or fine sandy clay loam	18	Shallow to very deep.
Dark brown	Friable	Heavy loam to sandy clay loam, or heavy rocky loam to sandy clay loam.	8– 9	Very shallow to moderately deep.
Reddish brown in the upper part; red in the lower part.	Friable in the upper part; firm in the lower part.	Silty clay loam in the upper part; silty clay in the lower part.	43	Very deep.
Light olive brown to olive gray faintly mottled with shades of gray and brown.	Firm, stiff; plastic when wet.	Clay	17	Shallow to very deep.
Faintly to distinctly mottled light brownish gray, olive yellow, and light olive brown in the upper part; pale olive or olive yellow faintly mottled with shades of gray and brown in the lower part.	Very firm; very plastic in the upper part when wet; plastic in the lower part when wet.	Clay	17	Shallow to moderately deep.
Yellowish brown[2]	Very friable	Silt loam or cherty silt loam	20	Deep to very deep.
Strong brown to yellowish red in the upper part; strong brown to reddish yellow in the lower part.	Friable in the upper part; firm to friable in the lower part.	Silty clay loam in the upper part; heavy silty clay loam or silty clay in the lower part.	31	Deep to very deep.
Yellowish brown grading into yellowish red and strong brown in the upper part; red or yellowish in the lower part.	Friable in the upper part; firm, stiff in the lower part.	Cherty silty clay loam, silty clay, or clay; cherty clay in the lower part.	21–34	Very deep.
Light yellowish brown in the upper part; in the lower part, grayish brown mottled with shades of brown, yellow, and gray[2].	Friable in the upper part; firm to friable in the lower part.	Cherty silt loam to cherty silty clay loam in the upper part; cherty silty clay in the lower part.	22	Very deep.
Mottled light yellowish brown and light gray[2]	Friable	Loam or sandy clay loam; grades into sandy clay as the depth increases.	20	Deep to very deep.
Yellowish brown or brownish yellow	Friable	Fine sandy loam to fine sandy clay loam, or fine sandy clay.	15–19	Shallow to deep.
Reddish brown, or red to dark red	Friable to firm	Heavy silty clay loam to silty clay	29–34	Shallow to very deep.

Series	Parent material	Slope	Position	Natural drainage	Surface soil	
					Color	Approximate thickness
		Percent				*Inches*
Huntington	Recent general alluvium from uplands underlain mainly by high-grade limestone; contains some materials originating from sandstone, shale, and other sedimentary rocks.	0–2	Bottom land.	Well drained	Dark brown or dark yellowish brown to dark grayish brown.	7–32
Jefferson	Old colluvium and local alluvium originating mainly from acid sandstone.	2–12	Colluvial slopes.	Well drained to somewhat excessively drained.	Yellowish brown, or pale brown to brownish yellow.	7–8
Johnsburg	Residuum from weathering of acid sandstone, conglomerate, and shale.	0–3	Upland	Somewhat poorly drained	Very pale brown to light gray; dark grayish brown in the upper 3 inches.	9
Leadvale	Old colluvium and local alluvium originating mainly from shale.	2–12	Colluvial slopes.	Somewhat poorly drained to moderately well drained.	Brownish yellow	5–6
Lindside	Recent general alluvium from uplands underlain mainly by high-grade limestone; contains some materials originating from sandstone, shale, and other sedimentary rocks.	0–2	Bottom land.	Somewhat poorly drained	Dark brown	16
	Residuum from weathering of—					
Lickdale	Acid sandstone, conglomerate, and shale	0–2	Upland	Poorly drained to very poorly drained.	Very dark brown	8
Linker	Sandstone and conglomerate, with beds of acid shale in places.	2–10	Upland	Well drained	Yellowish brown	6
Litz	Acid and calcareous shales that contain thin beds of limestone.	5–45	Upland	Excessively drained	Very dark brown (highly organic), or brownish yellow.	1½–5
Melvin	Recent general alluvium from uplands underlain mainly by high-grade limestone; contains some materials originating from sandstone, shale, and other sedimentary rocks.	0–2	Bottom land.	Poorly drained	Dark yellowish brown to yellowish brown distinctly mottled with pale yellow, light brownish gray, yellowish red, and reddish yellow.	12
	Old colluvium and local alluvium originating mainly from					
Minvale	Cherty dolomitic limestone	2–12	Colluvial slopes.	Well drained	Reddish yellow to strong brown or yellowish red.	5–7
Muse	Shale; contains materials from sandstone, limestone, cherty limestone, and chert in places.	2–12	Colluvial slopes.	Well drained to somewhat excessively drained.	Brown or yellowish red	5
Muskingum	Residuum from weathering of sandstone mainly; contains materials from shale and siltstone in places.	5–20	Upland	Excessively drained	Dark grayish brown to grayish brown or yellowish brown.	5–8
Ooltewah	Recent colluvium and local alluvium originating from limestone.	0–2	Colluvial slopes.	Poorly drained	Yellowish brown to dark yellowish brown; faintly mottled in the lower part.	10
Pace	Old colluvium and local alluvium originating mainly from very cherty dolomitic limestone.	2–12	Colluvial slopes.	Well drained to moderately well drained.	Pale brown	5–11
	Recent general alluvium from uplands underlain mainly by—					
Philo	Acid sandstone and shale	0–2	Bottom land.	Somewhat poorly drained	Pale brown to yellowish brown.	4
Pope	Acid sandstone and shale	0–2	Bottom land.	Well drained	Brown	10
Pottsville	Residuum from weathering of acid shale mainly.	10–20	Upland	Excessively drained	Light gray to pale brown, pale yellow, or yellow.	5–8
	Old mixed general alluvium from uplands underlain mainly by—					
Robertsville	Limestone, but in places by sandstone and shale.	0–2	Terraces	Poorly drained	Dark brown	3
Sequatchie	Sandstone and shale, but in places by limestone.	2–5	Terraces	Well drained	Dark brown to yellowish red	5–9
Sequoia	Residuum from weathering of shale associated with limestone.	5–12	Upland	Somewhat excessively drained.	Reddish brown to yellowish red.	5

See footnotes at end of table.

Subsoil				
Color	Consistence	Texture	Approximate thickness	Soil depth [1]
			Inches	
Dark yellowish brown or brown to reddish brown [2]	Very friable or friable	Silt loam, very fine sandy loam, light very fine sandy clay, or very fine sandy clay loam.	8-29	Very deep.
Brownish yellow or yellowish brown	Friable	Fine sandy clay	23–24	Shallow to very deep.
Pale yellow to light yellowish brown stained with dark-gray streaks in the upper part; faintly splotched to distinctly mottled gray, yellow, and brown in the lower part.	Friable	Silty clay or heavy silty clay loam	27	Moderately deep to deep.
Yellow to brownish yellow	Friable	Silty clay	9–10	Moderately deep to very deep.
Mottled dark brown, light brownish gray, and yellow [2].	Friable	Silt loam to silty clay loam	20	Very deep.
Dark gray faintly mottled with shades of yellow and brown; below this, mottled light gray, yellowish brown, and olive yellow.	Friable	Heavy very fine sandy clay to silty clay.	12	Deep to very deep.
Strong brown to yellowish red; the color becomes somewhat redder as the soil depth increases.	Friable	Fine sandy clay loam; the texture becomes somewhat finer as the soil depth increases.	17–20	Shallow to deep.
Brownish yellow [2]	Friable	Silt loam, or shaly silty clay loam to shaly clay.	5–10½	Very shallow to shallow.
Mottled grayish brown and light olive brown	Firm to friable; sticky and plastic when wet.	Silty clay loam to silty clay	18	Very deep.
Reddish yellow to yellowish red	Friable	Cherty silty clay loam to cherty silty clay, or silty clay loam to silty clay.	20–22	Deep to very deep.
Yellowish red in the upper part; reddish yellow in the lower part.	Friable	Silty clay	31 37	Shallow to very deep.
Yellowish brown [2]	Friable	Fine sandy loam, or stony fine sandy loam grading with increasing depth into stony light fine sandy clay loam.	7 10	Very shallow to deep.
Mottled pale yellow, brownish yellow, yellowish brown, and gray [2].	Friable	Heavy silty clay loam to silty clay	20	Very deep.
Grayish brown to yellowish brown	Friable	Cherty silt loam to cherty silty clay loam.	14–17	Deep to very deep.
Brownish yellow mottled with gray and brown [2]	Friable	Fine sandy clay loam	11	Shallow to very deep.
Strong brown faintly splotched with gray and yellow [2].	Friable	Heavy silt loam or silty clay loam	23	Shallow to very deep.
Pale yellow, pale brown, or yellow mottled with gray and brown in the lower part. [2]	Friable	Very fine sandy clay to shaly silty clay or shaly clay.	4– 7	Very shallow to shallow.
Light gray mottled with pale brown, brownish yellow, and reddish yellow.	Friable	Silty clay loam grading with increasing depth into silty clay.	24	Very deep.
Yellowish red faintly variegated with lighter and darker shades.	Friable	Loam to silty clay loam	6– 7	Very deep.
Yellowish red	Friable to firm	Silty clay	8	Very shallow to shallow.

TABLE 4.—*Principal characteristics*

Series	Parent material	Slope	Position	Natural drainage	Surface soil: Color	Surface soil: Approximate thickness
		Percent				*Inches*
Staser[6]	Recent local alluvium and colluvium from uplands underlain by acid sandstone and shale and calcareous rocks.	0–5	Bottom land.	Well drained	Grayish brown to reddish gray.	8
	Residuum from weathering of—					
Talbott	Clayey (argillaceous) limestone	2–25	Upland	Well drained to excessively drained.	Reddish brown to yellowish red.	5
Tellico	Calcareous sandstone and interbedded shale.	5–15	Upland	Well drained to somewhat excessively drained.	Dark reddish brown, reddish brown, or dark red.	5-10
Tupelo	Old mixed general alluvium from uplands underlain mainly by clayey (argillaceous) limestone.	0–2	Terraces	Somewhat poorly drained to poorly drained.	Dark brown to brown or yellowish brown.	7

[1] Soil depth as used here is the depth to significantly different material, such as bedrock or a bed of gravel. Descriptive terms refer to the following classes: Very shallow, 0 to 8 inches; shallow, 8 to 25 inches; moderately deep, 25 to 35 inches; deep, 35 to 60 inches; and very deep, 60 inches or more.

[2] Subsurface.

[3] The soils of the Barbourville series are mapped in this county only in complex with the Cotaco series.

Subsoil				
Color	Consistence	Texture	Approximate thickness	Soil depth[1]
			Inches	
Brown to reddish brown[2]	Friable	Loam; grades into sandy clay loam or fine sandy clay loam as the depth increases.	10	Very deep.
Yellowish red	Firm	Silty clay	16-20	Very shallow to very deep.
Dark red	Friable	Sandy clay	5 10	Very shallow to very deep.
Reddish yellow to brownish yellow mottled with shades of yellow, gray, and brown.	Very firm, tight	Silty clay	18	Deep to very deep.

[4] The soils of the Cotaco series are mapped in this county only in complex with the Barbourville series.

[5] In general, soils of the Hamblen series occur on bottom lands but in this county they occur in depressions in uplands, around drainage heads, and near the base of slopes in limestone valleys.

[6] In general, soils of the Staser series occur on bottom lands, but in this county they occur in slight depressions in uplands, around drainage heads and along foot slopes and drainageways in limestone valleys.

TABLE 5.—*Soil series, classified by soil orders and great soil groups, and factors that have produced differences in morphology*

ZONAL

Great soil group and series	Parent material	Relief	Degree of profile development: As indicated by number of significant genetic layers	Degree of profile development: As indicated by contrast in horizon
Red-Yellow Podzolic:				
Red members:				
	Residuum from weathering of—			
Dewey	High-grade limestone that contains chert in places.	Rolling to hilly	Strong	Medium.
Fullerton	Cherty dolomitic limestone	Rolling to hilly	Strong	Strong.
Linker	Sandstone and conglomerate, with shale beds in places.	Undulating to rolling	Strong	Strong.
Sequoia	Shale associated with limestone	Rolling	Strong	Strong.
Talbott	Clayey (argillaceous) limestone	Undulating to hilly	Strong	Strong.
Tellico	Calcareous sandstone and interbedded shale	Rolling to steep	Medium	Medium.
	Old colluvium and local alluvium mainly from—			
Allen	Sandstone but contains materials from limestone and shale.	Undulating to hilly	Strong	Strong.
Minvale	Cherty dolomitic limestone	Undulating to rolling	Strong	Strong.
Etowah	Old mixed general alluvium from uplands underlain mainly by limestone but in places by sandstone and shale.	Undulating	Strong	Medium.
Yellow members:				
	Residuum from the weathering of—			
Apison	Interbedded sandstone and shale, sandy shale, and siltstone.	Undulating to rolling	Strong	Strong.
Clarksville	Very cherty dolomitic limestone	Rolling to steep	Medium	Medium.
Hartsells	Sandstone and conglomerate, with beds of acid shale in places.	Undulating to rolling	Medium	Medium.
	Old colluvium and local alluvium mainly from—			
Jefferson	Acid sandstone	Undulating to rolling	Strong	Strong.
Muse	Shale; contains materials from sandstone, limestone, cherty limestone, and chert in places.	Undulating to rolling	Strong	Strong.
Pace	Very cherty dolomitic limestone	Undulating to rolling	Strong	Strong.
Capshaw	Old mixed general alluvium from uplands underlain mainly by limestone but in places by sandstone and shale.	Nearly level and very gently sloping to gently undulating.	Strong	Strong.
Gray-Brown Podzolic:				
Sequatchie	Old mixed general alluvium from uplands underlain mainly by sandstone and shale but in places by limestone.	Undulating	Medium	Medium.
Reddish-Brown Latosols:				
Hermitage	Old colluvium and local alluvium mainly from high-grade limestone.	Undulating to rolling	Strong	Medium.
Brown Forest (low base status):				
Crossville	Residuum from weathering of fine-grained sandstone, conglomerate, and interbedded shale.	Undulating to rolling	Weak	Weak.

INTRAZONAL

Great soil group and series	Parent material	Relief	As indicated by number of significant genetic layers	As indicated by contrast in horizon
Planosol:				
Fragipans:				
Johnsburg	Residuum from weathering of acid sandstone, conglomerate, and shale.	Level or nearly level to very gently sloping or very gently undulating.	Strong	Strong.
Leadvale	Old colluvium and local alluvium mainly from shale.	Undulating and rolling	Very strong	Strong.
Robertsville	Old mixed general alluvium from uplands underlain mainly by limestone but in places by sandstone and shale.	Level or nearly level	Strong	Very strong.
Argipans:				
	Residuum from weathering of—			
Colbert	Clayey (argillaceous) limestone with shale beds in places.	Undulating to rolling	Strong	Strong.
Dowellton	Highly clayey (argillaceous) limestone and calcareous clay shale.	Level or nearly level	Medium	Medium.
Tupelo	Old mixed general alluvium from uplands underlain mainly by clayey (argillaceous) limestone.	Level or nearly level	Strong	Strong.
Humic Gley:				
Dunning	Recent general alluvium from uplands underlain mainly by limestone.	Level or nearly level	Weak	Medium.

TABLE 5.—*Soil series, classified by soil orders and great soil groups, and factors that have produced differences in morphology*—Continued

INTRAZONAL—Continued

Great soil group and series	Parent material	Relief	Degree of profile development: As indicated by number of significant genetic layers	Degree of profile development: As indicated by contrast in horizon
Lickdale	Residuum from weathering of acid sandstone, conglomerate, and shale.	Level or nearly level	Weak	Strong.
Low-Humic Gley:	Recent general alluvium from uplands underlain mainly by—			
Atkins	Acid sandstone and shale.	Level or nearly level	Weak	Strong.
Melvin	High-grade limestone but contains some material from sandstone, shale, and other sedimentary rocks.	Level or nearly level	Weak	Strong.

AZONAL

Great soil group and series	Parent material	Relief	Degree of profile development: As indicated by number of significant genetic layers	Degree of profile development: As indicated by contrast in horizon
Lithosols:	Residuum from weathering of—			
Litz	Acid and calcareous shales that contain thin beds of limestone.	Rolling to steep	Weak	Weak.
Muskingum	Sandstone mainly; contains materials from shale and siltstone in places.	Rolling to hilly	Weak	Weak.
Pottsville	Acid shale mainly	Hilly	Weak	Weak.
Alluvial soils:	Recent colluvium and local alluvium mainly from—			
Abernathy	Limestone	Level or nearly level to gently sloping.	Very Weak	Very Weak.
Barbourville	Acid sandstone and shale	Nearly level to very gently sloping.	Very Weak	Very Weak.
Cotaco	Acid sandstone and shale	Same	Weak	Medium.
Greendale	Chert or cherty limestone	Level or nearly level to rolling.	Weak	Weak.
Ooltewah	Limestone	Level or nearly level	Weak	Medium.
	Recent general alluvium from uplands underlain mainly by			
Ennis	Chert or cherty limestone and cherty dolomite.	Level or nearly level	Very weak	Very weak.
Huntington	High-grade limestone containing materials originating from sandstone, shale, and other sedimentary rocks.	Level or nearly level	Very weak	Very weak.
Lindside	High-grade limestone containing materials originating from sandstone, shale, and other sedimentary rocks.	Level or nearly level	Weak	Medium.
Philo	Acid sandstone and shale	Level or nearly level	Weak	Medium.
Pope	Acid sandstone and shale	Level or nearly level	Very weak	Very weak.
	Recent local alluvium and colluvium from uplands underlain by			
Hamblen	Acid sandstone and shale and some calcareous rocks.	Level or nearly level	Weak	Weak.
Staser	Same	Level or nearly level	Very weak	Very weak.

Table 6.—*Approximate acreage and proportionate extent of soils mapped*

Soil	Acres	Percent
Abernathy silt loam	1,000	0.2
Allen clay loam:		
Severely eroded hilly phase	1,000	.2
Severely eroded rolling phase	1,000	.2
Allen loam:		
Eroded hilly phase	1,500	.3
Eroded rolling phase	1,000	.2
Eroded undulating phase	1,500	.3
Hilly phase	1,000	.2
Allen stony clay loam, severely eroded hilly phase	1,000	.2
Allen stony loam:		
Eroded rolling phase	1,000	.2
Hilly phase	1,000	.2
Apison loam:		
Eroded rolling phase	6,000	1.2
Eroded undulating phase	5,000	1.0
Rolling phase	6,000	1.2
Undulating phase	1,000	.2
Atkins silt loam	6,000	1.2
Capshaw silt loam	1,000	.2
Clarksville cherty silt loam:		
Eroded hilly phase	4,000	.8
Eroded rolling phase	6,000	1.2
Hilly phase	7,000	1.4
Rolling phase	3,000	.6
Steep phase	12,000	2.4
Clarksville cherty silty clay loam, severely eroded steep phase	7,000	1.4
Colbert silty clay, eroded rolling phase	2,000	.4
Colbert silty clay loam, eroded undulating phase	3,000	.6
Cotaco-Barbourville loams	3,000	.6
Crossville loam:		
Rolling phase	8,000	1.6
Undulating phase	3,000	.6
Crossville rocky loam:		
Rolling phase	7,000	1.4
Undulating phase	3,000	.6
Dewey silty clay loam:		
Eroded hilly phase	1,000	.2
Eroded rolling phase	1,000	.2
Dowellton silty clay loam	1,000	.2
Dunning silty clay	1,000	.2
Ennis cherty silt loam	1,000	.2
Ennis silt loam	1,000	.2
Etowah silt loam, eroded undulating phase	2,000	.4
Fullerton cherty silt loam:		
Eroded hilly phase	4,000	.8
Eroded rolling phase	6,000	1.2
Hilly phase	7,000	1.4
Rolling phase	7,000	1.4
Fullerton cherty silty clay loam, severely eroded hilly phase	2,000	.4
Greendale cherty silt loam	1,000	.2
Gullied land	2,000	.4
Hamblen loam, local alluvium phase	1,000	.2
Hartsells fine sandy loam:		
Eroded rolling phase	47,000	9.5
Eroded rolling shallow phase	36,000	7.3
Eroded undulating phase	72,220	14.6
Eroded undulating shallow phase	2,000	.4
Rolling phase	10,000	2.0
Rolling shallow phase	8,000	1.6
Undulating phase	5,000	1.0
Undulating shallow phase	1,000	.2
Hermitage silty clay loam:		
Eroded rolling phase	1,000	.2
Eroded undulating phase	1,000	.2
Severely eroded rolling phase	1,000	.2
Huntington fine sandy loam	1,000	.2
Huntington silt loam	1,500	.3
Jefferson loam:		
Eroded rolling phase	1,000	.2
Eroded undulating phase	1,000	.2
Johnsburg loam	1,500	0.3
Leadvale silt loam:		
Eroded rolling phase	500	.1
Eroded undulating phase	500	.1
Lickdale loam	1,000	.2
Lindside silt loam	2,000	.4
Linker fine sandy loam:		
Eroded rolling phase	3,000	.6
Eroded undulating phase	1,000	.2
Litz shaly silty clay loam:		
Eroded hilly phase	1,000	.2
Eroded rolling phase	500	.1
Eroded steep phase	500	.1
Litz silt loam:		
Hilly phase	1,000	.2
Rolling phase	1,000	.2
Steep phase	1,000	.2
Melvin silt loam	1,000	.2
Minvale cherty silt loam:		
Eroded rolling phase	1,000	.2
Eroded undulating phase	1,000	.2
Rolling phase	1,000	.2
Minvale silt loam:		
Eroded rolling phase	1,000	.2
Eroded undulating phase	1,000	.2
Muse silt loam:		
Eroded rolling phase	1,500	.3
Eroded undulating phase	1,500	.3
Muse silty clay loam, severely eroded rolling phase	500	.1
Muskingum fine sandy loam:		
Eroded hilly phase	5,000	1.0
Hilly phase	3,000	.6
Muskingum stony fine sandy loam:		
Hilly phase	15,000	3.0
Rolling phase	10,000	2.0
Ooltewah silt loam	500	.1
Pace cherty silt loam:		
Eroded rolling phase	1,000	.2
Eroded undulating phase	1,000	.2
Rolling phase	500	.1
Philo loam	1,000	.2
Pope loam	500	.1
Pottsville loam, hilly phase	2,500	.5
Pottsville shaly loam, eroded hilly phase	1,000	.2
Robertsville silt loam	1,000	.2
Rockland:		
Limestone, steep	3,000	.6
Sandstone, rolling	2,500	.5
Sandstone, steep	17,000	3.4
Sequatchie fine sandy loam:		
Eroded undulating phase	500	.1
Undulating phase	500	.1
Sequoia silty clay, severely eroded rolling phase	1,000	.2
Staser loam, local alluvium phase	1,000	.2
Stony colluvial land, steep	60,200	12.1
Stony rolling land, Talbott and Colbert soil materials	1,000	.2
Stony smooth land, Talbott and Colbert soil materials	1,000	.2
Talbott silty clay:		
Severely eroded hilly phase	1,000	.2
Severely eroded rolling phase	1,500	.3
Talbott silty clay loam:		
Eroded rolling phase	2,000	.4
Eroded undulating phase	1,500	.3
Tellico clay loam:		
Severely eroded hilly phase	2,000	.4
Eroded rolling phase	1,000	.2
Severely eroded steep phase	2,000	.4
Tellico loam, steep phase	2,000	.4
Tupelo silt loam	500	.1
Total	497,920	100.0

ABERNATHY SERIES

The soil of the well drained to moderately well drained Abernathy series is characterized by its dark-brown surface soil and brown to reddish-brown subsurface layer. It occurs on colluvial lands in the limestone valleys. The parent material has been washed from soils derived largely from limestone residue. The brown to reddish-brown color is inherited principally from the parent soil in most of the recently accumulated material, but it may be developed to some extent in older accumulations.

The soil is slightly acid, contains a moderately high quantity of organic matter, and has very high fertility. Permeability to water, roots, and air is moderate. The moisture-holding capacity of the soil is very high. Under common management practices the soil has very high productivity. It has a wide range of suitability.

Abernathy silt loam (0 to 5 percent slopes) (Aa).—This very deep soil occurs in shallow depressions, around drainage heads, on foot slopes, and along intermittent drainageways that extend into higher lying land. It is closely associated with Hermitage, Dewey, and Etowah soils and in places with Talbott, Fullerton, Minvale, Allen, Muse, and Sequoia soils. Some areas border on or grade into areas of Huntington or other soils of the bottom lands. The relief ranges from level or nearly level to gently sloping, but it is generally less than 3 percent. Slopes stronger than 3 percent are on the edges of the depressions where the local colluvium and alluvium were deposited. Such slopes also occur along small fairly rapid drains, where the deposits make a somewhat rough surface.

Runoff generally is slow. For the most part internal drainage is medium, but in places it may be slow in the underlying material. The soil has no true native vegetation because the parent material accumulated after erosion became active on higher surrounding areas that were cultivated. Small areas of this inextensive soil are fairly well distributed throughout each of the four small limestone valleys and in Deer Head Cove.

Profile description:

Surface soil—
0 to 14 inches, dark-brown friable silt loam; weak fine crumb structure.

Subsurface—
14 to 28 inches, brown to reddish-brown friable silty clay loam that is firm in place; hard when dry and sticky and plastic when wet; moderate medium granular structure.

Underlying material—
28 to 42 inches, dark reddish-brown friable silty clay loam, faintly mottled with shades of grayish brown and reddish yellow; sticky and plastic when wet.

The depth to bedrock is 6 feet or more. The range in texture is from heavy fine sandy loam to heavy silty clay loam. Most areas, however, have a heavy silt loam surface soil and a silty clay loam subsoil.

As mapped, this soil includes small areas of Swaim silt loam or silty clay loam. The surface soil in these areas is grayish-brown to reddish-brown friable silt loam to silty clay loam. The subsoil is yellowish-brown to reddish-yellow friable heavy silty clay loam. Most of the included areas are closely associated with Talbott and Colbert soils.

Use and suitability (I-1).—A large part of Abernathy silt loam is cultivated or in improved pasture. Some tracts are large enough to farm as a unit; others are so small that they are worked with larger areas of adjoining soils. Corn is the chief crop. Other crops are soybeans for hay, alfalfa, sorghum, and leafy vegetables. Areas on which water seldom stands during the growing season are used successfully for home gardens if they are otherwise suitably located. Many farmers plant potatoes, especially the fall crop, on selected areas. This soil is so easily worked and is so high in natural fertility that management requirements are not exacting.

The moisture absorption is good in most places, and erosion is generally not a problem. Some areas at the base of long slopes, however, will erode unless protected by terraces or contour tillage. Some areas in depressions require protection from excessive deposition of new materials, especially during the growing season. The very high productivity of this soil is caused partly by the addition of soil materials, organic matter, and plant nutrients that are brought in from well-fertilized soils and deposited over the surface by ponding waters.

This soil is suitable for corn, soybeans and other hay crops, and pasture. Cotton and general farm crops can be grown on some of the better drained gentle slopes. Very few areas are suitably located for the production of alfalfa, but some well-drained areas, when properly managed, have proved very satisfactory. Because the water table is high in winter, the soil is not well suited to rotations that include winter legumes.

ALLEN SERIES

The Allen series consists of well drained to somewhat excessively drained brown soils with red subsoils. These soils occur on foothills and fans near the base of rough, steep mountain bluffs. They developed over old colluvium and local alluvium derived largely from sandstone. These materials were modified to some extent by materials from limestone and shale that tumbled with the sandstone debris onto foot slopes of the high bluffs that border the limestone valleys. Rock debris, largely from limestone and shale or from shale alone, was associated with the sandstone materials that gave rise to the Allen soils. This debris weathered into the parent material of the Hermitage or other associated soils.

The parent rock of the Allen soils was not the same in all places, and consequently variations occur in the parent material and in the soil. The soil profile has a considerable uniformity, however, because of weathering and soil development. The fine particles that weathered from the sandstone, limestone, or shale near the surface have for the most part been carried away by excessive runoff or moved downward into the subsoil by percolation of absorbed moisture. They fill the spaces between larger particles in the subsoil. Deep cuts and gullies in the soil material reveal large sandstone boulders and blocks of nearly unweathered shale in many places. Limestone boulders, however, are present in only a few places because limestone dissolves during weathering and only the residue remains. The material below the subsoil usually is partly weathered or broken down. The larger spaces in this material have not been filled to any great extent by fine materials.

One belt of the Allen soils extends nearly continuously in Sand Valley along the base of Sand Mountain; another belt occupies the foot slopes of Lookout Moun-

tain along the southeastern edge of Railroad or Little Wills Valley. A few areas are in Deer Head Cove at the foot of Fox and Sand Mountains.

The loose friable surface soil of the Allen soils is more susceptible to shallow and deep gully erosion than to sheet erosion. However, where the firmer subsoil is exposed, sheet erosion may become very active. The Allen soils are eroded extensively because they were among the first to be used for cropland. Although they occupy mainly rolling and hilly positions, they were farmed without adequate conservation practices (fig. 5). Except for the severely eroded phases, the soils of the Allen series are generally medium to strongly acid, contain a moderate supply of organic matter, and have medium fertility. Permeability is moderately rapid in the surface soil and moderate in the subsoil. The moisture-holding capacity is moderate.

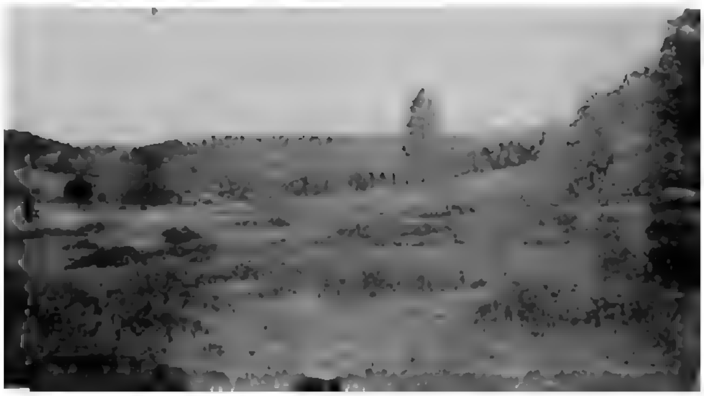

FIGURE 5.—Much of the acreage of the Allen soils has been severely eroded and abandoned. This area is being recleared for cultivation.

In general the Allen soils are not so fertile as the Hermitage, Dewey, Etowah, and other finer textured soils of the valleys. Under management practices commonly used, they are medium to low in productivity. They have a very wide to narrow range of suitability.

Allen loam, eroded undulating phase (2 to 5 percent slopes) (Af).—This is a well-drained moderately deep to very deep soil. It occupies colluvial and alluvial fans, foot slopes, benches and, in places, relatively broad nearly level tops of colluvial foothills. The soil developed under forest that consisted largely of mixed deciduous hardwoods and pines and, in places, scattered redcedars.

Runoff is slow to medium and internal drainage is medium. Most areas have lost 50 to 75 percent of the virgin surface soil through erosion. In some places the present plow layer consists of original surface soil, and in others, of a mixture of original surface layer and subsoil materials. In places erosion has been more severe and the plow layer consists almost entirely of subsoil material. The severely eroded areas are indicated on the soil map by symbol.

Profile description:

Surface soil—
0 to 7 inches, yellowish-brown to strong-brown friable loam or fine sandy loam; weak fine crumb structure.

Subsoil—
7 to 30 inches, red to reddish-brown friable clay loam; sticky and plastic when wet; moderate medium subangular blocky structure.

Underlying material—
30 to 44 inches, red friable sandy clay loam, splotched with reddish yellow; slightly compact in place; moderate fine to medium angular and subangular blocky structure having fairly well developed cleavage lines; outsides of the structure units darker than insides.

Depth to bedrock ranges from 2½ to 8 feet. In virgin areas the upper 3 inches are a dark-brown to dark grayish-brown very friable fine sandy loam. This layer contains a considerable quantity of decayed organic matter and many fine roots. The thickness of the cultivated layer ranges from 5 to 8 inches.

The color and texture of this soil vary considerably. Near the upper border of the foothills, the color in the subsoil is generally lighter red and the texture throughout the profile is more sandy. Farther down the slope the color is darker red or reddish brown and the texture is finer. The sandy covering, however, is very unevenly distributed over cropland because erosion has not been uniform. Some lower lying spots are considerably more sandy than those near the top of slopes. The texture of the surface soil is prevailingly loam, but it varies from fine sandy loam to sandy clay loam on the sharper breaks.

As mapped, this soil includes small acreages of Allen fine sandy loam, undulating phase, and Allen stony loam, eroded undulating phase.

Use and suitability (IIe–3).—Allen loam, eroded undulating phase, is well suited to nearly all crops. Most of the acreage is in row crops, chiefly corn and cotton. Several areas are in improved pasture.

The workability of the soil is generally very good, but stones interfere with tillage in some areas. Tilth is good except in severely eroded spots. Moisture absorption is moderately high on areas having a fairly deep sandy covering, but it is relatively low on nearly bald spots. The hazard of erosion is moderate. On the stronger slopes and sharper breaks where the surface soil is commonly thin, the soil can be improved if erosion is controlled. Areas that are underlain by shale or heavy clay need special care if the friable surface soil has washed away. Such areas are more common along the foot slopes of Lookout Mountain than along those of Sand Mountain.

The response of this soil to good management is medium to very good. Furthermore, the soil can be kept in excellent condition for crop production. It may be less fertile than some of the silt loams and silty clay loams on the uplands, but this disadvantage is offset by its easy workability and good response to the use of cover crops and mineral fertilizers.

Allen loam, eroded rolling phase (5 to 12 percent slopes) (Ae).—In profile characteristics, this soil is similar to Allen loam, eroded undulating phase. However, erosion has removed more of original surface soil. Consequently, the surface soil is, for the most part, redder because more red subsoil has been mixed with the remaining surface soil through tillage. Nevertheless, the plow layer is neither so red nor so heavy as that of the severely eroded rolling and the severely eroded hilly phases of Allen clay loam. Allen loam, eroded rolling phase, is extensive and is closely associated with other Allen soils, Jefferson soils, and, in places, Hermitage soils. Runoff and internal drainage are medium.

The surface soil is yellowish-red to reddish-brown friable loam, 5 to 8 inches thick. The subsoil is red to

reddish-brown friable clay loam, 16 to 21 inches thick. The depth of the soil to bedrock ranges from 2 to 7 feet.

As mapped, this soil includes small areas of Allen fine sandy loam, rolling phase, and Allen loam, rolling phase, still in virgin forest. Severely eroded and gullied spots also are included and are indicated on the soil map by symbol.

Use and suitability (IIIe–3).—Allen loam, eroded rolling phase, is used chiefly for corn and cotton. Minor crops such as soybeans, field peas, and peanuts are grown occasionally. Few annual close-growing crops are grown because they are not economically feasible under the management used. Most of the soil has been terraced, and many areas are kept in fairly good to good condition. Other areas are poorly maintained.

The workability of this soil is good. Tilth also is good except where the friable surface soil has been lost through erosion. The hazard of erosion is moderate to severe. The soil has good moisture-absorbing qualities, but under ordinary conditions not much moisture is absorbed, especially from short heavy showers.

Corn and cotton are fairly well suited to this soil under good management. This management includes control of runoff, the use of cover crops, especially winter legumes, contour tillage, and proper rotation. In the rotation, row crops for a period of 1 to 3 years may be followed by pasture of sericea lespedeza. Such practice will depend on the condition of the soil, the slope, and cultural methods. Response to good management practices is medium to good.

Under good management, including erosion control, most areas can be kept in fairly good condition for close-growing crops. Sericea lespedeza is satisfactory for improved pasture. To establish a good pasture it is necessary to clip weeds, use more fertilizers, and repair terraces or maintain other conservation practices. Very little or no grazing is advisable before the pasture is well established. The pasture requires 1 or 2 years to become established, but once established, it will last for many years under proper management, including proper fertilization.

Allen loam, hilly phase (12 to 25 percent slopes) (Ag).—Because of the strong slopes, the weathering of the parent material of this soil is less uniform and the action of soil-forming processes has been weaker and generally to less depth than in Allen soils having milder relief.

Runoff is rapid and internal drainage is medium. Seepage from higher positions tends to maintain a fairly high water table in places, and sometimes springs appear in wet weather. The natural vegetation is largely mixed hardwoods and scattered pines.

The surface soil is 9 to 10 inches thick. The first inch or two is dark-brown to dark grayish-brown very friable fine sandy loam that contains a considerable quantity of decomposed organic matter. Below this dark layer the surface soil is yellowish-brown to strong-brown friable loam or fine sandy loam. The subsoil is red to reddish-brown friable clay loam about 20 inches thick. The texture and consistence of the subsoil vary somewhat according to the character of the dominant rock from which its material came. The material from sandstone and clay shale, where deposited in large blocks, generally remains more distinct than material from limestone or sandy shale. Bedrock underlies the soil at depths of 2 to 6 feet.

Use and suitability (IVe–1).—The very small acreage of this soil is in forest, to which it is well suited. Pine is the principal cover in much of the cutover forest.

This soil has only fair workability. The hazard of erosion is high. Response to good management practices is medium to very good.

Allen loam, eroded hilly phase (12 to 25 percent slopes) (Ad).—Before being cleared and opened to cultivation, this soil was identical to Allen loam, hilly phase. The present plow layer consists of remnants of the original surface soil mixed with subsoil material during tillage. Runoff is rapid. Internal drainage is medium. The total area of this soil is small. The soil is closely associated with other Allen soils, although in some places it is bordered on the upper side by Rockland, sandstone, steep.

This soil has a yellowish-red to reddish-brown friable loam plow layer or surface soil 5 to 6 inches thick. The subsoil consists of red to reddish-brown friable clay loam, 14 to 18 inches thick. Depths to bedrock range from 1½ to 6 feet.

Use and suitability (IVe–1).—This soil is used largely for row crops, mainly corn and cotton. Ordinary farming practices are used. Most areas occasionally lie idle for a year or more because of a scarcity of farm help and limited demand for cropland. Some areas are in range pasture; others have reverted to forest, mainly pine.

Workability is fair, but the hazard of further erosion is high. It is possible to conserve the soil and improve moisture absorption and tilth by the use of good conservation practices. Runoff and erosion can be controlled fairly well on most areas by terraces and the use of close-growing plants, chiefly improved pasture. The moisture-absorbing qualities become poorer as more of the friable material in the surface layer is lost. Although the moisture-holding capacity is moderate, under ordinary care the soil does not retain enough moisture to meet plant requirements during dry periods. Response to good management practices is medium to very good.

This soil is suitable for improved pasture if surface runoff and erosion are controlled. Sericea lespedeza is the best plant for this purpose. The pasture requires 2 or 3 years to become established, and thin or bare spots may need reseeding before a good stand is produced. Under proper management the pasture will last for many years. North and east slopes are better for improved pasture than south and west slopes. The soil is also suitable for forest.

Allen stony loam, eroded rolling phase (5 to 12 percent slopes) (Ak).—This soil is similar to Allen loam, eroded rolling phase, in positions occupied and in many profile characteristics. It differs chiefly in that numerous rock fragments occur on the surface and in the soil. The fragments range from about 4 inches to more than 12 inches across. They are mainly sandstone, but a few are chert or limestone. In places large sandstone or limestone boulders are strewn over the surface or embedded in the soil. The boulders are too large to be removed without blasting.

Runoff and internal drainage are medium. The native cover was mainly deciduous hardwoods, mixed with pine in places, but some areas probably were largely in pine. Most cleared land that has returned to forest now has nearly solid stands of pine.

About three-fourths of the soil has lost 25 to 75 percent of the original surface soil through erosion. The present eroded surface soil ranges from 6 to 8 inches in thickness. It consists of yellowish-red to reddish-brown friable stony loam. The subsoil is red to reddish-brown friable stony clay loam, 16 to 21 inches thick. Depths to bedrock are from 2 to 7 feet. In many fairly stony areas the surface soil has a relatively fine texture and is brown to reddish brown.

Use and suitability (IVe–4).—This inextensive soil is used chiefly for pasture. Although very little is in good improved pasture, more than 50 percent has been enclosed for common range pasture. Some abandoned fields are in pasture, whereas other areas cleared or partly cleared for pasture have never been used for crops. Probably less than 35 percent of this soil is in crops. Corn is the most common crop. A small part of the soil is in forest.

Workability is fair, and except in severely eroded spots, tilth is good. The hazard of further erosion is moderate. Moisture absorption is good under native forest, but it generally is low to very low on cropland. In cleared pastureland moisture absorption is fair to moderately high and depends largely on the character of the grass cover. Workability, tilth, and moisture-absorbing qualities can be improved by using better conservation practices. The removal of surface stones improves the ease of tillage. Response to good management is medium to good. This soil should be valuable for improved pasture if runoff is controlled and other management is good.

Allen stony loam, hilly phase (12 to 25 percent slopes) (Al).—This soil has more stone fragments strewn over the surface and mixed through the soil than Allen loam, hilly phase. It differs from Allen stony loam, eroded rolling phase, in that it is virtually uneroded, has stronger slopes, and has more stones that are more than 12 inches in diameter. In some areas many of the stones are more than 24 inches in diameter. Allen stony loam, hilly phase, is inextensive and is closely associated with other soils of the Allen series. It occupies hilly areas on foot slopes of Sand and Lookout Mountains. The parent material originated to some extent from shale in areas near the border of steeper and rougher land.

The soil had rapid runoff and medium internal drainage. Its native cover was probably deciduous hardwoods and some pines. The present forest varies from mainly hardwoods in some places to mainly pines in others. All areas have been cut over from time to time, and where the cutting has been heavy, pine tends to dominate.

Use and suitability (VIe–2).—The small aggregate area of this soil is mostly in forest, to which it is best suited. The soil has poor workability. The erosion hazard is high.

This soil has a medium to very good response to good management. Although best suited to trees, some parts may be suitable for pasture if cleared.

Allen clay loam, severely eroded rolling phase (5 to 12 percent slopes) (Ac).—This soil occupies positions similar to those of Allen loam, eroded rolling phase, but it is severely eroded and has a predominantly finer textured plow layer. The plow layer consists largely of subsoil material, because nearly all the original surface soil has been removed by erosion. Shallow gullies occur in places. Runoff is rapid and internal drainage is medium.

The plow layer and subsoil are red to reddish-brown friable clay loam. The subsoil ranges in thickness from 8 to 15 inches. Below the subsoil is an accumulation of unconsolidated soil material of colluvial and alluvial origin. The depth of the soil to bedrock is from 1½ to 6 feet.

The soil is strongly acid, very low in organic matter, and low in fertility. It is moderately permeable. The moisture-holding capacity is moderate to low.

Use and suitability (IVe–1).—This soil has a small total acreage. All areas were once used mainly for row crops, but under present practices they are idle or in unimproved pasture. Volunteer grasses and other plants furnish scant grazing for livestock. Some areas have reverted to forest, mainly pine.

Except when restored under good conservation and tillage practices, workability and tilth are poor. Under ordinary care the soil is so highly erodible that little organic matter can accumulate in the plow layer, and good tilth cannot develop. Under good conservation practices, including the use of heavy machinery to smooth out the rough areas, these defects can be corrected. The quantity of moisture absorbed is not enough for crops, even under moderately dry conditions. The moisture-absorbing qualities can be improved by control of runoff.

Some of the soil has been reclaimed by terracing and by leveling or smoothing out the rough or gullied places. Most of the areas can be used best for improved pasture. Sericea lespedeza alone generally makes the best pasture, but this crop requires 1 to 2 years to become established. Some farmers, however, seed fescue or other grasses with the sericea lespedeza, and a few use other grass mixtures. Although the reclaimed soil can be used for improved pasture, occasionally the pasture can be followed by 1 to 3 years of row crops, usually corn or cotton, if good management, including contour tillage, is maintained. The response of this severely eroded rolling phase to good management is only medium.

Allen clay loam, severely eroded hilly phase (12 to 25 percent slopes) (Ab).—This soil consists of areas that have lost nearly all or all the original loam surface soil and, in places, part of the subsoil through erosion. Some small areas occur that have retained a considerable part of the original surface soil. Small gullies are common, especially in idle areas. This soil has rapid runoff and medium internal drainage.

The present plow layer is composed almost entirely of subsoil material. It consists of red to reddish-brown friable clay loam. The subsoil also consists of red to reddish-brown friable clay loam that is 6 to 14 inches thick. Bedrock occurs at depths of 1½ to 6 feet.

The soil is strongly acid, very low in organic matter, and low in fertility. It is moderately permeable and has a moderate to low moisture-holding capacity.

Use and suitability (IVe–1).—Under present farm practices, most of the relatively small acreage of this soil is idle or has reverted to forest. The cultivated areas are used mainly for row crops, principally corn. Very few areas have been improved for permanent pasture; a few have been fenced for common range pasture consisting of volunteer grasses and other plants of low grazing value.

Allen clay loam, severely eroded hilly phase, has poor workability. The hazard of further erosion is high. Conservation measures are very difficult to apply, and reclamation is difficult and expensive. Moisture absorption is low because of the severe erosion, and the soil does not receive enough moisture for plant growth, except during wet seasons.

The soil, nevertheless, has many qualities that make it moderately responsive to good management. Management practices include the control of runoff and the use of winter cover crops if row crops are to be grown. Row crops are not suitable, but they may be planted after several years of pasture to clean up weeds by cultivation. At the present time, improved pasture or forest are the best uses for this soil. Sericea lespedeza is one of the best plants for improved pasture.

Allen stony clay loam, severely eroded hilly phase (12 to 25 percent slopes) (Ah).—This soil consists of areas (originally Allen stony loam, hilly phase) that were cleared for cultivation and have lost nearly all or all of the surface soil and, in places, part of the subsoil through severe erosion. In many of the most severely eroded areas the stones are larger than elsewhere; very few are less than 12 inches in diameter. There are some fairly deep to deep gullies in most places. As mapped, the soil includes some less severely eroded areas. Runoff is rapid and internal drainage is medium.

The plow layer is composed entirely or almost entirely of subsoil material. This layer and the subsoil consist of red to reddish-brown friable stony clay loam. The subsoil is 6 to 14 inches thick; bedrock occurs at 1½ to 6 feet.

The soil is strongly acid, very low in organic matter, and low in fertility. It is moderately permeable and has a moderate to moderately low moisture-holding capacity.

Use and suitability (VIe–2).—Most areas of this inextensive soil are idle or reseeding to forest, mainly pine. Some areas are in common range pasture; a few are planted to row crops, chiefly corn.

This soil has poor workability. It is highly susceptible to further erosion. Except for forest, to which the soil is best suited, the only suitable use is improved permanent pasture. Sericea lespedeza is well suited and may prove fairly satisfactory for pasture on selected areas.

APISON SERIES

The soils of the Apison series occur on the sandstone plateaus.[5] They are on ridgetops, on slopes, and on benchlike positions or fans near the base of slopes. They are closely associated with Hartsells, Pottsville, and Muskingum soils, and, in places, with Linker and Crossville soils. They differ from the Hartsells soils mainly in that their parent material is paler in color and contains a higher percentage of clay derived from acid shale. They resemble Pottsville soils in source of parent material, but they have a deeper profile and occupy more gently sloping positions on uplands.

The Apison soils are shallow to deep and have light-colored friable surface soils and friable to firm subsoils that are usually mottled below 20 inches. The soil parent material has weathered from (1) interbedded sandstone, (2) shale, (3) thin beds of sandstone alternating with thin layers of lenses of shale, and (4) relatively thick beds of sandy shale. The resulting parent material is seldom uniform over very large areas. The deep sandy shale, however, usually produces more uniform parent material, but its texture will vary somewhat according to the proportion of sand and clay included. In places the subsoil rests almost directly on nearly unweathered gray clay shale.

The more common underlying material is partly weathered, very thinly bedded or stratified, varicolored layers of sandstone, siltstone, and shale or indurated shale. The stratified layers may form a bed several feet thick that rests directly on clay shale. In places the bed may be relatively thin and rest on one or more layers of sandstone underlain by shale. The thinly bedded, or stratified, layers of sandstone, siltstone, and indurated shale may break in weathering into small fragments that range up to 1½ inches in length and ¼ inch in thickness. Quantities of these fragments make a channery or gravelly soil. The fragments may be numerous in some places or entirely absent in others.

Variations in texture, content of platy fragments, depth to bedrock, type of bedrock, and color are common in Apison soils. The texture ranges from fine sandy loam to silt loam within fairly short distances, but there is usually a loam for each area as a whole. A few areas, however, do have fairly uniform texture throughout. In some localities the sand content is higher than in others. Areas in the vicinity of Pea Ridge generally contain more sand in the surface soils and subsoils than those south of Guest. In general, the sand in the Apison soils is fine to very fine. The silt content is generally fairly high, so that the surface soil has a loose floury feel. Platy fragments on the surface or in the soil range from abundant in some places to none in others. Very platy or channery soil is known locally as gravelly soil. Such areas are indicated by symbol on the soil map. The fragments that occur in these areas are generally so small that they seldom interfere with tillage or harvesting.

The soils of the Apison series are generally medium to strongly acid, low in supply of organic matter, and low in fertility. Permeability is moderately rapid in the plow layer and moderately slow in the subsoil.

In this county the Apison soils are next below Hartsells soils in total acreage of agriculturally important soils. They are low in productivity and have a medium range of suitability.

Apison loam, undulating phase (2 to 5 percent slopes) (Ap).—This soil is mainly in forest and in very slightly eroded recently cleared areas. It was developed under a forest consisting largely of deciduous hardwoods and scattered pines. The wooded areas have been cut over from time to time. The present stand probably contains more pine than the virgin forest, inasmuch as pine reseeds itself more readily than most other trees in the area.

Runoff is slow to medium. Surplus water, however, remains on the surface for only brief periods after heavy showers or prolonged rains. Internal drainage is medium to slow. Most areas of this soil are small, but they are widely distributed over Lookout and Sand Mountains.

[5] The Apison soils were classified as Enders soils in Jackson, Morgan, and other counties in northern Alabama.

Profile description:

Surface soil—
- 0 to 8 inches, yellowish-brown to brownish-yellow friable loam to very fine sandy loam; pale yellow when dry; very weak fine blocky structure.

Subsoil—
- 8 to 22 inches, brownish-yellow to yellowish-brown friable silty clay to heavy silty clay loam; yellow when dry, plastic and sticky when wet; moderate medium blocky structure.
- 22 to 36 inches, mottled brownish-yellow, yellowish-brown, yellow, reddish-yellow, and gray firm to friable silty clay; plastic when wet; strong medium blocky structure.

Parent material—
- 36 inches +, soft rock material weathered from sandstone, shale, and siltstone.

In virgin areas the upper 3-inch layer of the surface soil is a very dark grayish-brown, very friable loam. It contains a fairly high percentage of decayed organic matter and many small roots. Depths to bedrock range from 2 to 3½ feet.

Use and suitability (IIIe–5).—Most of this soil is in forest. Some areas are used for corn, cotton, sorghum, soybeans for hay, and pasture. This soil is usually bordered by Apison loam, rolling phase, or other tillable soil. Most of these areas can be worked in fairly large units.

Workability is very good and tilth is good. The friable surface layer and upper subsoil have good moisture-absorbing qualities, but the generally finer textured lower subsoil and the nearly impervious underlying parent material absorb moisture very slowly. Consequently, after the surface soil becomes saturated during heavy showers or prolonged wet periods, excessive runoff develops and causes considerable sheet erosion and shallow gully erosion. The problems of soil and moisture conservation can be met, however, if adequate control measures are employed before the soil becomes seriously eroded.

Although this soil is naturally low in plant nutrients, it responds very well to good management. Under good management corn, cotton, sorghum, soybeans for hay, and pasture can be grown satisfactorily. The soil generally is less desirable for row crops than Hartsells fine sandy loam, undulating phase, but it is as good or better for pasture. Sericea lespedeza will provide satisfactory grazing on practically all areas of this soil, if good seeding and other good management practices are followed. Fescue and Ladino clover are successful on selected areas that have been improved by suitable fertilization and other good practices.

Apison loam, eroded undulating phase (2 to 5 percent slopes) (An).—This soil differs from Apison loam, undulating phase, mainly in that it has been under cultivation for a number of years and has been eroded to various degrees. Most areas have lost about 50 to 75 percent of the original surface soil through sheet erosion; some have lost additional material through shallow gully erosion. In a few small areas erosion has been severe. These areas are indicated on the soil map by symbol.

Runoff and internal drainage are slow to medium. The moisture-holding capacity is low. After wet periods, seepage is not uncommon on large slopes. This soil occurs in widely distributed areas on Lookout and Sand Mountains.

In most areas the present plow layer consists of remnants of the original surface soil mixed with subsoil material brought up by the plow. It is yellowish-brown to brownish-yellow friable loam. The subsoil is similar to that of Apison loam, undulating phase, but depths to bedrock are generally less, or from 1½ to 3 feet.

Use and suitability (IIIe–5).—The large total acreage of this soil is mostly in crops. About half is used for corn, one-fourth for cotton, and the rest for minor crops and improved pasture. The yields are somewhat lower than on Hartsells fine sandy loam, eroded undulating phase, under comparable management, but pasture grasses and legumes do as well or better than on the Hartsells soil.

This soil has good workability, fair to good tilth, and fair to good water absorption. It is moderately susceptible to further erosion, but the relief is favorable to soil and moisture conservation.

The practice of rotating field crops and pasture is becoming more common as dairying and livestock raising increase. Improved pasture is well suited to this soil, particularly if the pasture is rotated with field crops. For the most part, the soil is suited to winter legumes, but some more nearly level areas may require artificial drainage to prevent injury to the crop. The small severely eroded areas are poorly suited to crops and pasture, but they can be improved through erosion control.

Like most other agricultural soils favorably situated on the sandstone plateaus, this soil is farmed according to fairly high standards. The range in management varies, although most farmers tend to follow the cultural practices developed at the Sand Mountain Substation at Crossville and the recommendations of the county agricultural agencies. This soil responds very well to good management.

Apison loam, rolling phase (5 to 10 percent slopes) (Ao).—This soil differs from Apison loam, undulating phase, mainly in having stronger slopes. Runoff is medium; internal drainage is medium to slow. The moisture-holding capacity is moderate. Seepage is common on long slopes after heavy showers and during prolonged wet weather. The soil developed under forest vegetation, largely deciduous hardwoods and scattered pines. In most places the present forest has more pine than the original cover because pine seeds well and grows more rapidly than many hardwoods. Several large areas of this extensive soil are on the northeastern and east-central parts of Lookout Mountain.

The surface soil is 7 to 9 inches thick. In virgin areas the first inch or two is very dark grayish-brown very friable loam. Below this layer is a yellowish-brown to brownish-yellow, friable, smooth loam to very fine sandy loam. The subsoil is about 25 inches thick. The upper part is brownish-yellow to yellowish-brown friable silty clay to heavy silty clay loam. The lower part is mottled brownish-yellow, yellowish-brown, yellow, reddish-yellow, and gray firm to friable silty clay. The depth of the soil to bedrock ranges from 1 to 3 feet.

Use and suitability (IIIe–5).—Most of this soil is in forest. Every year, however, some areas are cleared for crops and improved pasture.

The soil has good workability and tilth and absorbs moisture well. It is moderately to highly erodible when cropped; conservation practices must be started as

soon as the soil is cleared. Some of the strongly rolling, more shaly areas can be conserved best by a cover of forest. This soil responds only moderately well to good management.

Apison loam, eroded rolling phase (5 to 10 percent slopes) (Am).—This soil differs from Apison loam, rolling phase, in having lost 50 to 75 percent of its original surface soil through erosion. It is strongly acid and has a moderately low moisture-holding capacity. Runoff is medium to rapid; internal drainage is medium to slow. The areas of this extensive soil are widely distributed over Lookout and Sand Mountains.

The plow layer is a mixture of the remaining surface soil and subsoil material brought up by the plow. It consists of yellowish-brown to brownish-yellow friable loam. The subsoil is similar to that of Apison loam, rolling phase, but depth to bedrock is generally less and ranges from 1 to 2 feet.

As mapped, this soil includes some severely eroded areas that have lost practically all the original surface soil. In these areas the plow layer consists mostly of subsoil material. Also included are some undulating or gently sloping areas on fairly narrow ridgetops and on benches and fans.

Use and suitability (IIIe–5).—Apison loam, eroded rolling phase, is used for corn, cotton, and minor row crops; very little is planted to annual close-growing crops. Some areas are in improved pasture.

This soil has fair to good workability. It is moderately to highly erodible, and erosion has impaired its tilth and moisture absorption. If runoff is not controlled, the quantity of moisture that enters the soil and is retained is usually not sufficient for good plant growth. Soil and moisture conservation is fairly difficult. The response of this soil to good management is only medium.

The soil is well suited to sericea lespedeza for hay or pasture. Well-fertilized selected areas are suitable for pasture of fescue and Ladino clover. Other grass-legume mixtures have proved successful. Usually this soil is somewhat better suited to cotton than to corn; but some of the more severely eroded areas, especially those with firm silty clay subsoils, are not well suited to either crop. Such areas frequently are idle or are reverting to pine. Some of the idle land can be used to advantage for pasture of sericea lespedeza.

ATKINS SERIES

The soil of the Atkins series is poorly drained and occupies first bottoms that are subject to overflow. It occurs on narrow flood plains along intermittent and permanent drainageways on the sandstone plateaus. It is distinguished by a dark-colored surface soil and a mottled subsoil. This soil has formed from recent general alluvium derived from uplands underlain chiefly by acid sandstone and shale. This parent material is similar to that of Pope and Philo soils in all characteristics except texture, which is usually finer. The color of the profile is similar to that of Melvin and Robertsville soils on poorly drained bottom lands along streams in the limestone valleys.

The soil is medium to strongly acid, contains a moderate supply of organic matter, and has medium fertility. Permeability is moderately rapid in the surface soil and moderate in the subsoil. Moisture-holding capacity is high. Productivity of the soil is low, and the range of suitability is narrow.

Atkins silt loam (0 to 2 percent slopes) (Au).—This soil is closely associated with Pope and Philo soils on the flood plains of the sandstone plateaus. It is bordered by Muskingum, Hartsells, and Apison soils of the uplands. The slopes are 2 percent or less in most places, but are somewhat stronger on very narrow strips that border lower lying channels or swales.

Runoff is very slow. In places, especially on cleared areas, it can be improved by artificial drainage so that excess water does not stand very long on the surface. Internal drainage is slow, and the subsoil remains saturated throughout most of the year. After heavy rains and prolonged wet periods, small intermittent drains and most of the streams receive more water than their channels can carry, and flooding results.

The native vegetation is mainly deciduous hardwoods. Scattered pines occur in some places and water-tolerant species in others. Pines reseed very rapidly in most cutover or partly cleared areas.

Profile description:

Surface soil—
- 0 to 4 inches, dark-gray to very dark grayish-brown friable silt loam; soft when dry, sticky when wet.
- 4 to 10 inches, gray to dark grayish-brown friable heavy silt loam to silty clay loam; soft when dry, sticky and plastic when wet; white to light gray when dry, showing faint fine mottles of yellow and reddish yellow.

Subsoil—
- 10 to 30 inches, when wet, grayish-brown sticky silty clay loam having faint mottles of shades of yellow, brown, and gray; when moist, light brownish-gray and firm and displays distinct brown and brownish-yellow mottles; massive structure.

Underlying material—
- 30 inches +, mottled general alluvium composed chiefly of sand, silt, and clay.

Depths of this soil to bedrock are 3 to 5 feet or more. The soil usually has a medium to fine texture that ranges from a silt loam to silty clay loam in the surface soil and from silty clay loam to silty clay in the subsoil. In places the soil contains much sand. Here the texture ranges from a sandy loam to very fine sandy loam in the surface soil and sandy clay loam to sandy clay in the subsoil. Most of the soil is mottled to various degrees, but in places the entire profile is grayish brown to brown.

Use and suitability (IVw–1).—Most of the fairly large acreage of Atkins silt loam is in native forest, but some is cleared annually for improved pasture.

Workability is good to poor. If amply drained, the soil has very good workability and good tilth and moisture absorption. There is no hazard of ordinary erosion, but the hazard of stream erosion is great.

Because most of this soil is subject to flash floods, only parts of it are suitable for crops, even where ample drainage can be established. Many areas, however, are excellent for improved pasture of fescue, whiteclover, and other grasses or grass mixtures. If long areas of flood plains are left open, floodwaters may develop currents strong enough to remove the alluvium. Therefore, small patches of forest or brushland should be retained in places to check the rapid flow along small streams and intermittent drainageways.

Selected areas, even along fairly large streams, can be developed for crops. If the soil is amply drained, it is well suited to corn and sorghum for sirup. It re-

sponds very well to good management practices that include adequate drainage for common crops.

CAPSHAW SERIES

The soil of the Capshaw series is light colored and moderately well drained. It occupies positions on low stream terraces in the limestone valleys. It was derived from old mixed general alluvium washed from soils underlain mainly by limestone but in places by sandstone and shale. The Capshaw soil is associated with Etowah soils of the high stream terraces, and the Sequatchie, with Tupelo, and Robertsville soils of the low stream terraces. It is also associated with Colbert soils of the uplands, Muse soils of the colluvial lands, and Huntington soils of the bottom lands. Capshaw soil is not so brown in the surface layer or so red in the subsoil as the Etowah and Sequatchie soils and is more yellow or yellowish brown and more uniform than the Tupelo. It is less well drained than the Etowah and Sequatchie soils and better drained than the Tupelo soil.

Capshaw soil is medium to strongly acid, low in organic matter, and medium in fertility. Permeability is moderate in the surface soil and moderately slow in the subsoil. The moisture-holding capacity is high.

The series has medium productivity and a wide range of suitability. It is used principally for crops and pasture.

Capshaw silt loam (0 to 5 percent slopes) (Ca).—This soil has nearly level, very gently sloping, and gently undulating relief. The common range in slope is 1 to 3 percent, but the slopes are stronger on short, fairly sharp breaks to swales and drainageways. Runoff is slow to medium, and internal drainage is medium. The original forest cover was principally oak and hickory. Scattered pines and redcedars occur in places. Most areas of this soil are in Big Wills Valley near and south of Lebanon; a few areas are in other valleys, but none is in Deer Head Cove.

Profile description:

Surface soil—
- 0 to 8 inches, light yellowish-brown very friable silt loam to yellowish-brown friable silty clay loam; weak fine granular structure.

Subsoil—
- 8 to 15 inches, yellowish-brown to grayish-brown friable silty clay loam to silty clay; weak medium blocky structure.
- 15 to 28 inches, yellowish-brown to yellow friable silty clay; sticky when wet; moderate medium blocky structure.

Underlying material—
- 28 to 40 inches, distinctly mottled yellow, gray, brown, and reddish-brown firm to friable silty clay to clay; sticky and plastic when wet, hard when dry; moderate medium blocky structure.

The depth of the soil to bedrock ranges from 4 to 15 feet. In virgin or grassland areas the upper few inches of the surface layer are very dark brown to dark grayish brown. In places the subsoil is mottled or splotched with various shades of gray and brown at 20 to 22 inches. Small, round, hard concretions are abundant locally on the surface, in the surface soil, or in the subsoil.

As mapped, this soil includes some fairly large gently sloping areas that have a paler color, slightly finer texture, and more restricted internal drainage. This included soil has characteristics that resemble those of both Capshaw silt loam and Tupelo silt loam, and it can be used in practically the same way as the Capshaw soil. In most areas it has been artificially drained and is therefore suitable for more crops than Tupelo silt loam. In general the surface layer is light brownish-gray to pale-brown friable silt loam. The upper part of the subsoil is faintly mottled pale-brown to light yellowish-brown firm to friable heavy silty clay loam to silty clay. The lower part is prominently mottled gray, brown, and yellow, firm, heavy silty clay to clay that is sticky when wet.

Use and suitability (IIIw–1).—Most areas of Capshaw silt loam have been cleared and used for crops for a long time. Corn and cotton are chiefly grown.

Workability is very good and tilth is good. Moisture-absorbing qualities are excellent. Because of the gentle slopes and nearly level positions occupied by the soil, the hazard of erosion is only slight to moderate.

This soil is desirable for agriculture. It is well suited to corn and cotton, and also to lespedeza, soybeans, and other hay crops, and to pasture. Some of the nearly level areas are better suited to corn and pasture than to cotton. The soil warms somewhat later in spring than Etowah or Sequatchie soils. In many areas, if the drainage is improved by artificial means, the surface dries more rapidly and the land can be tilled sooner. Other areas of Capshaw silt loam need artificial drainage if winter cover crops are to be grown successfully.

Several fairly large areas, especially those associated very closely with Tupelo and Robertsville soils, have been developed for improved pasture. Good pasture includes mixtures of fescue and whiteclover. The response to good management is medium to high.

CLARKSVILLE SERIES

The Clarksville series consists of well drained to excessively drained light-colored soils on uplands. These soils developed from highly leached and very cherty parent material derived from very cherty dolomitic limestone. The parent material is mainly residuum from weathered chert modified to various degrees by clays from limestone and shale. The soils occupy positions on tops and upper slopes of chert ridges in limestone valleys similar to those occupied by Fullerton soils. They are associated with Fullerton soils on upland positions and with Minvale, Pace, and Greendale soils on the colluvial slopes. The soils developed under forest vegetation that was largely deciduous hardwoods mixed with pine and redcedar. In many areas the present forest cover is largely pine.

Soils of the Clarksville series are strongly acid and low in organic matter and fertility. The surface soil ranges from moderately permeable to rapidly permeable, and the subsoil is moderately permeable.

Productivity is generally low, but it is very low in severely eroded steep areas. The range of suitability for the series is medium to very narrow. The soils are principally in forest and crops; some areas are idle or in pasture.

Clarksville cherty silt loam, rolling phase (5 to 12 percent slopes) (Ce).—This is probably the best developed and most representative soil of the Clarksville series in De Kalb County. Although the slopes range from 5 to 12 percent, many ridge crests and broader

tops are undulating and have milder slopes—some less than 2 percent. These undulating areas are small and often very cherty, but they may be used in about the same way as the rolling areas.

Runoff and internal drainage are medium. The surface soil is rapidly permeable. The moisture-holding capacity is moderate. This moderately extensive soil is mostly on the central ridge, which consists largely of chert derived from dolomitic limestone. Some areas are on the eastern and the western ridges that were derived from Fort Payne chert.

Profile description:

Surface soil—
: 0 to 7 inches, light-gray very friable to friable cherty silt loam; weak fine crumb and single-grain structure.

Subsoil—
: 7 to 30 inches, pale-yellow to light yellowish-brown friable cherty silty clay loam to cherty clay; sticky when wet, hard when dry; moderate fine blocky structure.

Parent material—
: 30 inches +, yellowish-brown to white almost solid mass of chert fragments; clay fills the cracks and other small spaces.

In some areas the upper 1- to 3-inch surface soil is dark grayish-brown very friable to friable cherty silt loam. The size of the chert fragments on the surface and in the soil differs greatly. Some areas contain many fine fragments, but most areas, especially those on the narrow ridgetops, contain an abundance of coarse fragments.

Use and suitability (IIIe–2).—Most of this soil is in cutover forest. Some areas are fenced and used for range pasture of native or voluntary grasses and other plants. A few areas have been cleared under pasture-improvement programs. Some of the soil was once cultivated and has since reverted to forest.

Workability is only fair because the cherty fragments on and in the soil interfere with tillage. The hazard of erosion is slight to moderate. Loose chert in the surface soil increases moisture absorption, but the high content in the soil decreases moisture-holding capacity. The clay around the chert fragments, especially in the lower part of the subsoil and underlying material, holds considerable moisture. Some of the moisture is available to trees and other deep-rooted plants but not to most general farm crops. Consequently, if this soil is used for crops, the moisture supply will be only moderate except in favorable seasons.

Although the soil is severely leached of soluble plant nutrients and is low in natural fertility, the response to good management practices is very good.

Clarksville cherty silt loam, eroded rolling phase (5 to 12 percent slopes) (Cc).—Before this soil was cleared and put in cultivation, it was practically identical to Clarksville cherty silt loam, rolling phase. It has now lost about 50 percent or more of the virgin friable surface soil through erosion. Runoff and internal drainage are medium. Permeability is moderately rapid in the plow layer. The moisture-holding capacity of this soil is moderate.

In cultivated areas subsoil material has been mixed with remnants of the original surface soil during tillage. The present plow layer consists of light brownish-gray to pale-yellow friable cherty silt loam. The subsoil is pale-yellow to light yellowish-brown friable cherty clay loam or cherty clay. It is about 22 inches thick.

Use and suitability (IIIe–2).—This soil has been cleared, and most of the small total acreage is used for annual row crops. Corn and cotton are the chief crops, although some minor crops are planted. Cover crops are not generally grown, but they are needed to supply organic matter. Very little of this soil has been used for improved pasture, but under recent pasture programs sericea lespedeza is proving very satisfactory.

This soil has fair workability in areas relatively free from coarse chert. Areas that have large and more numerous chert fragments are more difficult to work. The chert interferes with the use of mowers, combines, and harvesters. Many of the fragments are hard, angular, and sharp and damage plows and other soil-working implements.

The tilth is fairly good to poor, depending on the quantity and size of the chert fragments on the surface and in the soil. The soil is moderately erodible, but many shallow gullies will develop on the stronger slopes if conservation practices are not adequate. Moisture-absorbing qualities are good, except in areas where much of the friable surface soil has been lost. The soil is somewhat droughty for crops because the presence of chert, especially in the subsoil, reduces its moisture-holding capacity. Even though the soil is low in fertility and organic matter, it responds very well to good management.

Clarksville cherty silt loam, hilly phase (12 to 25 percent slopes) (Cd).—This soil differs from Clarksville cherty silt loam, rolling phase, chiefly in slope. It is closely associated with other Clarksville and Fullerton soils on chert ridges in the limestone valleys. Runoff is rapid and internal drainage is medium. The surface soil is rapidly permeable, and the subsoil is moderately permeable. The moisture-holding capacity is moderate to low.

The surface soil generally is light-gray very friable to friable cherty silt loam about 7 inches thick. In some virgin areas the upper surface soil to a depth of 1 to 3 inches is dark grayish-brown very friable cherty silt loam. The subsoil consists of pale-yellow to light yellowish-brown friable cherty silty clay loam to cherty clay and is about 22 inches thick.

Use and suitability (IVe–2).—Most of this soil has never been completely cleared for crops. Some areas may have been under cultivation or cleared at some time in the past, but they have reseeded to trees. The present cutover forest consists largely of mixed pines and hardwoods. The percentage of pine is now probably higher than in the original stand because pine species reseed more freely than most hardwoods.

This soil has poor workability. If cleared and cultivated and not adequately protected by vegetation or other means, it would be moderately to highly erodible. Under proper management, this soil would be highly responsive. Some of the milder slopes are fairly well suited to improved pasture of sericea lespedeza, but under present conditions the soil can be used best for forest.

Clarksville cherty silt loam, eroded hilly phase (12 to 25 percent slopes) (Cb).—This soil differs from Clarksville cherty silt loam, hilly phase, in that it has lost 50 percent or more of the original friable surface soil through erosion after the forest was removed and the soil cultivated. The general slope range is considerably less than 12 to 25 percent on included narrow ridgetops.

Runoff is rapid and internal drainage is medium. Permeability is moderately rapid in the plow layer and moderate in the subsoil. The moisture-holding capacity is moderate to low.

The present plow layer is a mixture of original surface soil and subsoil material brought up by the plow. It is a light brownish-gray to pale-yellow, friable, cherty silt loam. The subsoil consists of pale-brown to light yellowish-brown friable cherty silty clay loam or cherty clay and is about 21 inches thick. In some small areas the soil has been severely eroded and has lost nearly all or all of its original surface soil and, in places, part of the subsoil. The plow layer consists almost entirely or entirely of subsoil material. It is pale-yellow to light yellowish-brown friable cherty silty clay loam or cherty clay. These severely eroded areas are indicated on the soil map by symbol.

Use and suitability (IVe–2).—About half of this soil is used annually for crops. Some areas are idle, a few have reverted to forest, and others have been fenced for range pasture. Most of the cultivated areas are used for crops, mainly corn, but some cotton is grown. The acreage of other crops is small. Improved pastures of sericea lespedeza have been developed with good results on a few areas. Such pasture may become one of the most important uses for this soil. The severely eroded areas are best suited to forest, especially pine.

This soil has poor workability because of the strong slopes and chertiness of the surface layer. It is more difficult to work where the stiff cherty clay is exposed. Tilth is usually somewhat poor because of chertiness and the loss of much of the original friable surface layer. Moisture absorption is fairly slow. Under good conservation practices, both tilth and moisture-absorbing qualities can be improved. Response to proper management is very good.

Clarksville cherty silt loam, steep phase (25 to 45 percent slopes) (Cf).—This soil differs from Clarksville cherty silt loam, rolling phase, mainly in having stronger slopes and generally less depth to bedrock. Runoff is rapid to very rapid, and internal drainage is medium. Permeability is moderately rapid in the surface soil and moderate in the subsoil. The moisture-holding capacity is low. The native vegetation on this soil is mainly deciduous hardwoods, but some pines occur.

In virgin areas the surface soil is about 7 inches thick. It is dark grayish-brown very friable cherty silt loam in the upper 1 to 3 inches and light-gray very friable to friable cherty silt loam in the lower 4 inches. The subsoil is pale-yellow to light yellowish-brown friable cherty silty clay loam or cherty clay and is about 21 inches thick.

Although the slopes are steep, some very narrow ridgetops and small benches having more gentle slopes are included because they are too small to be shown separately on the map. The ridgetops generally are very cherty or stony; the chert fragments in these areas are less than 1 inch to more than 24 inches in diameter. The large blocks of chert generally break into numerous small fragments if they are moved. The small benches are fairly free from coarse chert.

As mapped, this soil includes Fullerton cherty silt loam, steep phase. Accurate separation of the Fullerton soil is not possible on a soil map of the scale used. This inclusion has a reddish subsoil that distinguishes it from the Clarksville soil. This subsoil is fairly continuous and uniform. For the most part it ranges from the dominant yellow of the Clarksville soil to the dominant red of the Fullerton soil. The two soils have very similar surface layers and are suitable for similar uses.

Use and suitability (VIe–1).—Most of the large total area of Clarksville cherty silt loam, steep phase, has never been cleared. Much of the forest has been cut over from time to time, and it probably now has more pine than the original forest. Some areas have been cleared and fenced for common range pasture, but the grazing capacity is low.

This soil has very poor workability. The erosion hazard is very high. Its response to good management is only medium. It can be used best for trees.

Clarksville cherty silty clay loam, severely eroded steep phase (25 to 45 percent slopes) (Cg).—This soil is similar to Clarksville cherty silt loam, steep phase, but it has been cleared and is severely eroded. Runoff is very rapid, and internal drainage is medium. The soil is moderately permeable, and its moisture-holding capacity is low. It is inextensive and is closely associated with other soils of the Clarksville series and with Fullerton soils.

All or nearly all of the original surface soil has been lost, and in places part of the subsoil. The present plow layer consists mostly or entirely of subsoil material. It is pale-yellow to light yellowish-brown, friable, cherty silty clay loam or cherty silty clay.

Use and suitability (VIe–1).—Most of this soil is used for row crops. Corn, the chief crop, is followed by cotton. Other crops are grown to a small extent. Fairly large areas are idle or in common range pasture. A small part has grown up in volunteer forest consisting largely of pine.

This soil has very poor workability because of steep slopes and chertiness. It has poor tilth because of severe erosion and inadequate conservation practices. It is almost impossible to conserve if used mainly for row crops. The response to good management is only medium. Little of the soil has been used for improved pasture, but experiments indicate that fairly satisfactory yields can be expected, especially from sericea lespedeza. Forest is the best use for this soil.

COLBERT SERIES

The soils of the Colbert series are distinguished by their very firm, or tight, heavy silty clay subsoils. They have dominantly olive-brown to light yellowish-brown surface soils and yellowish-brown subsoils. On the uplands they are closely associated with Talbott soils and have similar parent material. The Talbott soils, however, are less sticky and plastic when wet and have yellowish-red subsoils.

The parent material of the Colbert soils was derived largely from clayey (argillaceous) limestone and shale. In this county the material is largely residual in origin; that is, the limestone and shale residues remained in place.

Some areas derived from residuum blend into areas derived from alluvial material, particularly where the slopes are rather gentle. In these areas the parent material is transitional between that of the normal Colbert soil and the normal alluvial soils, such as the Capshaw or Tupelo. The areas that developed from residual

material are tighter and stiffer and, when wet, more plastic and sticky than those that developed from parent material modified by colluvial or alluvial material.

The Colbert soils developed under a forest consisting largely of deciduous hardwoods, scattered pines, and, in places, redcedars. The hardwoods were several varieties of oak and hickory and sweetgum, blackgum, maple, beech, persimmon, elm, ash, hackberry, and tulip-poplar. The undergrowth consisted of brush, vines, and briers. Some areas that are shallow to limestone bedrock had nearly solid stands of redcedar.

Colbert soils are medium to strongly acid and contain a low supply of organic matter. They have moderate to low productivity and a medium to narrow range of suitability. They are used principally for crops, although some areas are in pasture.

Colbert silty clay loam, eroded undulating phase (2 to 5 percent slopes) (Ck).—This is a somewhat poorly drained to moderately well drained, moderately fine textured soil of the limestone valleys. The color of the dry, rain-packed plowed surface ranges from white to very pale brown. Runoff is medium and internal drainage is slow.

In many virgin areas the friable surface soil was not deep enough to form an entire plow layer. After the soil was cleared for crops, erosion, especially sheet erosion, became active, and about half of the original surface soil was lost. The present plow layer is a mixture of original surface soil and subsoil material. Some large boulders and outcrops of limestone bedrock occur in many areas. This fairly extensive soil occurs mostly in Big Wills and West Lookout Valleys.

This soil has medium fertility. Permeability is moderately slow in the surface soil and very slow in the subsoil. The water-absorbing capacity of the soil is poor, and the moisture-holding capacity is too low for good production.

Profile description:

Surface soil—
0 to 5 inches (plow layer), olive-brown to light yellowish-brown, firm, heavy silty clay loam; white to very pale brown when dry; sticky and plastic when wet; hard when dry; weak medium granular structure.

Subsoil—
5 to 18 inches (claypan), yellowish-brown very firm, tight, silty clay; sticky and plastic when wet; checks and cracks when drying; dry fragments are angular and hard; weak medium blocky structure; massive when wet.

Parent material—
18 to 36 inches, mottled reddish-yellow, yellow, and olive-brown, firm, stiff, heavy clay; massive structure.

In the few nearly virgin areas the upper 2 inches of the surface soil is dark grayish-brown to olive-brown, friable, mellow silty clay loam, fairly high in organic matter. The depth of this eroded undulating phase to bedrock ranges from 1 to 3 feet, although outcrops occur in many places. Various quantities of chert fragments occur on the surface and in the soil in places, but large fragments are not common. A few areas are covered with an overwash ranging in texture from gravelly fine sandy loam to fairly heavy loam and in depth from a thin smear to nearly 18 inches. These areas have the same subsoil and underlying material as the soil of the foregoing profile description. They occupy less than 10 percent of the total acreage of this mapping unit.

Use and suitability (IIIs–1).—Practically all areas of Colbert silty clay loam, eroded undulating phase, have been used many years for crops, mainly corn and cotton. Small patches of minor crops have also been grown. Oats and other grains have been popular at times. The use of the soil for improved pasture is increasing.

Workability is poor, and tilth has been impaired by erosion. The optimum moisture range for cultivation is very narrow. The soil is sticky or puddles too easily to be worked when wet, and it is too hard when it is dry. It is moderately erodible, but serious loss of the soil can be avoided and considerable moisture can be saved by proper conservation practices. In areas covered with the loamy overwash, workability is easy, and tilth and moisture absorption are good. Conservation measures are necessary, however, to retain the loamy surface layer.

The response of this soil to good management is only medium. Improvement in yields can be obtained on selected areas, however, if a winter cover crop is included in the rotation or other methods are used to increase the supply of organic matter in the soil.

This soil is better suited to hay and pasture than to general field crops. Fescue and other grasses or white-clover and legumes can be grown in most areas, and winter legumes give fair yields in places. The more nearly level, more slowly drained areas are not suited to winter legumes, although they are well suited to fescue-Ladino clover mixtures used for pasture. The more strongly sloping or undulating areas are better for sericea lespedeza, which can be used for hay or pasture.

Colbert silty clay, eroded rolling phase (5 to 12 percent slopes) (Ch).—This soil has stronger slopes and a somewhat finer texture in the plow layer than Colbert silty clay loam, eroded undulating phase, and has lost more of its original surface soil through erosion. Most areas have lost half to all of the original friable surface soil, and, in places, some of the subsoil. Shallow gullies have formed in some areas. The soil is associated with other members of the Colbert series, and with Talbott, Hermitage, Muse, Leadvale, Litz, Allen, and Jefferson soils, as well as with Rockland, limestone, steep. It borders areas of Capshaw and Tupelo soils in places.

This soil has rapid runoff and medium internal drainage. It is very slowly permeable and has a low moisture-holding capacity. Fertility is medium to low.

The present plow layer is olive-brown to yellowish-brown, firm, heavy silty clay loam to silty clay. The subsoil consists of yellowish-brown, very firm, tight silty clay about 10 inches thick. Bedrock occurs at depths of $\frac{1}{2}$ to $2\frac{1}{2}$ feet.

Some areas that border shale or limestone areas on steeper slopes have parent material that is partly colluvial wash, a greater depth to bedrock, and generally stronger relief. A few included areas have a shallow loamy overwash. Severely sheet-eroded areas and gullied spots occur in places and are indicated on the soil map by symbol. In most areas that are shallow to bedrock, slopes seldom exceed 8 percent.

Use and suitability (IVe–5).—Most of the fairly extensive area of this soil has been cleared and is used largely for crops. A small part has never been cleared. The soil is most commonly used for row crops, chiefly corn and cotton. This use is not advantageous on most

areas, even where the land has been well terraced. Some parts of this soil have been fenced for common range pasture, but the native or voluntary grasses and legumes furnish scant grazing. A few areas are idle or are reseeding to forest, principally pine.

Erosion has impaired workability, tilth, and moisture-absorbing qualities more severely than for Colbert silty clay loam, eroded undulating phase. Adequate soil moisture is more difficult to maintain because of the very firm, tight, heavy clay subsoil and the moderately to strongly rolling relief. Most areas cannot be terraced profitably for row crops. Terraces, however, can be used for close-growing crops, especially for grazing, except on the very severely gullied or nearly mutilated areas. Only a small part of the soil has been improved for permanent pasture. Pasture mixtures have been used to some extent, but they are not so well suited as sericea lespedeza. Very severely eroded areas and areas not suitably located for pasture should be planted to pine. Response of this soil to good management is medium.

COTACO AND BARBOURVILLE SERIES

The soils of the Cotaco and Barbourville series are mapped as a complex because they are so intricately associated and their areas are generally so small that separation on the soil map is not feasible. Of the large aggregate area, about three-fourths is Cotaco loam, and the rest is Barbourville loam. Both soils occur on colluvial lands, and both have formed from parent material that consists of recent colluvium and local alluvium originating mainly from acid sandstone and shale. The materials washed mainly from Hartsells, Linker, and Muskingum soils and in places from Apison and Crossville soils.

The Cotaco and Barbourville soils differ principally in drainage and color. Differences in drainage are indicated by the presence or absence of mottling in the surface soil and upper part of the subsurface layer. Mottling is common in the lower part of either soil. A high water table increases the mottling in the upper part of the subsurface layer and in the surface layer.

The Cotaco soil is somewhat poorly drained to moderately well drained. It has a dark-gray to grayish-brown surface soil. Its subsurface layer is mottled or splotched with shades of grayish brown and yellow. The Barbourville soil is well drained to moderately well drained. It has a brown to yellowish-brown surface soil and a uniformly colored grayish-brown, brown, or yellowish-brown subsurface layer.

The soils of this complex are medium to strongly acid, except where the acidity has been modified by wash from limed soils or by applications of lime or some other neutralizing agent. The soils have a moderate supply of organic matter and medium fertility. Permeability is rapid in the surface soil and moderately rapid in the subsurface layer. The moisture-holding capacity is high, especially where drainage systems prevent supersaturation of the soils.

These soils have medium to high productivity and a medium to wide range of suitability. They are used principally for crops and pasture.

Cotaco-Barbourville loams (1 to 3 percent slopes) **(Cl)**.—These loams make up a complex of sandy soils on the sandstone plateaus. The soils show little or no profile development. They occupy positions at the base of slopes, around drainage heads, in swales, and in depressions. They are closely associated with the soils from which their material was washed and in many places border Atkins, Philo, and Pope soils of first bottoms. The areas generally are small, but they commonly include both the Cotaco and Barbourville soils.

Cotaco loam has slow runoff and slow to medium internal drainage. Generally, it can be improved by providing better outlets for excess surface water. Barbourville loam has slow runoff and medium internal drainage.

The soils of this complex had no native cover because the local colluvium and alluvium accumulated after the surrounding higher lying soils had been cleared and tilled. The areas are widely distributed over the sandstone plateaus and include many strips of first bottoms too small to map separately.

Profile descriptions:

Cotaco loam:
- Surface soil—
  - 0 to 10 inches, dark-gray to grayish-brown friable loam; some mottles; weak fine crumb structure.
- Subsurface—
  - 10 to 28 inches, friable loam or fine sandy clay loam splotched or mottled with shades of gray, brown, and yellow.
- Underlying material—
  - 28 inches +, colluvial and alluvial materials; color and texture varies.

Barbourville loam:
- Surface soil—
  - 0 to 8 inches, brown to yellowish-brown friable loam; pale brown to very pale brown when dry; weak fine crumb structure.
- Subsurface—
  - 8 to 20 inches, grayish-brown, brown, or yellowish-brown, friable, heavy loam to sandy clay loam; light yellowish-brown to very pale brown when dry; sticky when wet.
- Underlying material—
  - 20 to 32 inches, firm to friable heavy sandy clay loam to sandy clay or clay, faintly to distinctly mottled or splotched with grayish brown, yellowish brown, or gray; massive structure.

Considerable variation occurs in Cotaco loam, especially in the depth of the recently accumulated local colluvium and alluvium and in the texture of the soil. The texture ranges from friable fine sandy loam to friable sandy clay loam in the surface soil and from a loose friable loam to firm sandy clay in the subsoil. The depth to bedrock ranges from 2 to 7 feet. The finer textured colluvium commonly occurs in areas more or less influenced by soil materials derived from sandstone interbedded with shale, especially where the soil is associated with Apison, Crossville, and Pottsville soils. The soil is usually free of rock fragments.

Barbourville loam has about the same variations in texture and depth to bedrock as Cotaco loam. However, the lower part of the subsurface layer varies somewhat in color; in places it is mottled or splotched with shades of gray, yellow, and brown.

Use and suitability (IIw–1).—Cotaco-Barbourville loams are used for crops and pasture. Corn is the principal crop, but sorghum, soybeans, potatoes, and other minor crops and garden plants do well. Cotton is not commonly grown. These soils are well suited to fescue-whiteclover pasture. Other grass and clover mixtures have proved very satisfactory, but lime is usually required.

Under ample natural or artificial drainage, the soils of this complex have excellent workability, tilth, and

moisture-absorbing qualities. Their response to proper management is very good. Areas containing material washed from well-fertilized soils may produce excellent crops with little or no additional fertilizer. In most areas, however, the fertilizer requirement is about the same as for Hartsells, Linker, or Apison soils.

Cotaco-Barbourville loams usually are so closely associated that each area of this complex can be farmed as if it contained only Cotaco loam. Cotaco loam generally needs some artificial drainage, whereas Barbourville loam is sufficiently well drained, under natural conditions, for crops such as corn, hay, and sorghum, and possibly for cotton. Occasionally, operators till only the better drained Barbourville loam and allow the wetter Cotaco loam to lie idle. If Cotaco loam is provided with an outlet for excessive moisture, the entire area can be used as a unit. The extent of drainage depends on the use for which the soil is intended. The removal of excess moisture in both the surface soil and subsurface layer is needed for most crops. Pastures, however, require very little subsurface drainage. In many pasture areas, subsurface drainage is not desirable.

CROSSVILLE SERIES

The Crossville series consists of soils characterized largely by their brown color throughout the profile and partly by their texture, consistence, organic-matter content, and depth to bedrock (fig. 6). The parent material is largely residual from the weathering of

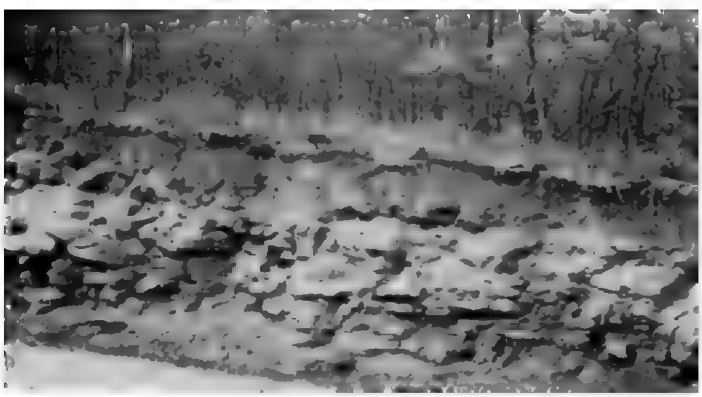

FIGURE 6.—Crossville loam, undulating phase, showing the low color contrast of the profile and shallow depth to sandstone bedrock.

fine-grained sandstone, conglomerate, and interbedded shale. The soils occur on the sandstone plateaus and are closely associated with Muskingum, and, in places, Apison soils. The Hartsells and Muskingum soils usually occupy the highest areas. The soils of the Crossville series are widely distributed on both Lookout and Sand Mountains. Some of the largest areas are north of Mentone, northeast of Ider, and west of Ruhama School.

The depth of the Crossville soils to bedrock ranges from about 1 to 2½ feet, but large flat rock surfaces are exposed in many areas. The soils usually are on the lower side of the bedrock outcrops, but in some areas a succession of outcropping rock ledges occurs. In areas where the depth to bedrock is greater than 2½ feet, the lower part of the subsoil is more nearly like the subsoil of the Hartsells series in color, texture, and consistence.

In some areas many sandstone fragments occur on the surface and in the soil. The fragments are less than 4 to more than 15 inches in diameter. In the rocky areas, bedrock usually lies at depths of 2 feet or less. All areas are subject to seepage, which usually emerges as wet-weather springs.

The soils of the Crossville series are medium to strongly acid. They contain a moderate supply of organic matter and are low to medium in fertility. The surface soil is rapidly permeable, and the subsoil is moderately permeable. The moisture-holding capacity ranges from low to high.

These soils have low to medium productivity and a medium to wide range of suitability. They are used principally for crops and pastures. Some areas are in forest.

Crossville loam, undulating phase (2 to 5 percent slopes) (Cn).—This is the most representative soil of the Crossville series in the county. It occurs on gently to moderately sloping areas, gently sloping places around drainage heads, slight depressions in nearly level uplands, and relatively level upland divides. In most areas colluvial material has accumulated.

Runoff is slow to medium. The moisture-holding capacity is high. Excess water generally does not remain on the surface very long. Where the soil is nearly level, however, runoff is very slow, especially in those areas under grass or forest. Internal drainage is medium, but seepage keeps the soil saturated in places for some time after heavy showers or prolonged wet periods.

The native vegetation is largely Virginia pine. Grasses, shrubs, lichens, and mosses grow in forest openings. The organic matter in forested areas is high and was probably derived from grass, lichens, and mosses. The areas of this soil are mostly less than 50 acres in size.

Profile description:

Surface soil—
- 0 to 5 inches, dark-brown to dark reddish-brown, friable, mellow loam; light yellowish brown when dry, slightly sticky and plastic when wet; weak fine granular structure.
- 5 to 16 inches, dark reddish-brown, friable, heavy loam; brown to yellowish brown when dry; very weak fine blocky to medium blocky structure.

Subsoil—
- 16 to 25 inches, dark-brown, friable, heavy loam to sandy clay loam; light yellowish brown when dry; very weak fine blocky to medium blocky structure.

Parent rock—
- 25 inches +, fine-grained, flat, hard sandstone.

Depth to bedrock commonly varies; the range is from 1½ to 2½ feet. The texture is fairly uniform from the surface to bedrock, although it varies in places. In the deepest areas the soil generally is very friable near the bedrock. It resembles Hartsells fine sandy loam, undulating phase, in texture and color. Most areas have few outcrops of bedrock and few sandstone fragments on the surface and in the soil. However, in places outcrops of bedrock occur, as well as sandstone fragments less than 4 inches to more than 15 inches in diameter. These stony areas are too small to outline on the soil map and are indicated by symbol.

Use and suitability (IIIe–5).—A large part of this soil has been cleared and is used for general farm crops and pasture (fig. 7).

FIGURE 7.—Watermelon plants under frost caps on Crossville loam, undulating phase.

The soil has very good workability over a wide range of moisture content. Soft seepy spots, however, are so common during wet periods that they may interfere with tillage of a whole area. The soil has granular mellow tilth and good moisture-absorbing qualities in all areas except those that are very shallow to bedrock. The hazard of erosion is slight to moderate. The stronger slopes, however, require protection from erosion when used for row crops. Small losses of soil on areas shallow to bedrock can become serious in time.

For the most part, the soil is better suited to corn than to cotton. Farmers who have only a small acreage of this soil seldom use it for cotton because this crop tends to grow larger stalks and to produce less lint than on Hartsells, Linker, and Apison soils. Cotton can be grown with fair success on the better drained areas, however. The soil is excellent for hay and pasture. It responds very well to good management practices.

Crossville loam, rolling phase (5 to 10 percent slopes) (Cm).—This soil has the same profile characteristics as Crossville loam, undulating phase, but it has stronger slopes and is less uniform in depth to bedrock. In addition, it has more bedrock outcrops and rock fragments on the surface and in the profile. The relief, however, is gently rolling or gently sloping, and gradients stronger than 7 percent are rare.

Use and suitability (IIIe–5).—About half of this soil is in crops, chiefly corn and cotton. Such row crops, however, are not very well suited unless measures are taken to conserve soil and moisture. Under present practices more areas of this soil are being improved for permanent pasture, to which it is well suited. The less rolling areas are used largely for fescue-Ladino clover pasture, but the more strongly rolling slopes are often used for sericea lespedeza.

This soil has good workability and is moderately erodible. The moisture-holding capacity is moderate to high. The soil responds very well to good management practices.

Crossville rocky loam, undulating phase (2 to 5 percent slopes) (Cp).—This soil has the color, texture, and consistence of Crossville loam, undulating phase, but contains many loose sandstone fragments that range from 4 to more than 15 inches in diameter. Sandstone outcrops occur in places. The soil is shallow to very shallow to bedrock.

Runoff is slow to medium and internal drainage is medium. The moisture-holding capacity is moderate. The native vegetation is chiefly deciduous hardwoods and Virginia pine. Mosses and lichens grow in places.

The surface soil is about 15 inches thick. In the upper 5 inches, it is dark-brown to dark reddish-brown, friable, mellow, rocky loam. In the lower 10 inches, it is dark reddish-brown, friable, heavy, rocky loam. The exposed rock fragments in virgin areas are usually partly embedded in the surface soil. On cleared or pastured areas, many rock fragments are strewn loosely over the surface. The subsoil consists of dark-brown, friable, heavy, rocky loam to sandy clay loam and is about 8 inches thick.

Use and suitability (IVe–4).—Only a small part of this soil has been cleared for crops, and probably less than 25 percent has been partly improved for pasture. A fairly large part has been fenced for common range pasture. Some well-improved pastures, however, have been established.

Workability is only fair. The soil is too stony to till. Many areas, however, have been partly cleared of rock fragments, and some bedrock ledges have been blasted to make the soil tillable. The hazard of erosion is slight to moderate. The soil responds very well to good management practices. Its best use is for pasture; Ladino clover and fescue are suitable pasture plants. Other mixtures that include whiteclover are fairly satisfactory. In some places this soil is best suited to forest.

Crossville rocky loam, rolling phase, 5 to 10 percent slopes) (Co).—This soil resembles Crossville rocky loam, undulating phase, in most characteristics, but it occurs on stronger slopes. Runoff and internal drainage are medium, but small seepy places are common. The moisture-holding capacity is moderate to low.

The native cover is largely deciduous hardwoods and Virginia pine. In some areas Virginia pine is dominant. Other areas are glady, and large, flat, fine-grained sandstones are exposed. Mosses and lichens are abundant among scattered pines in the glades. Many areas are too shallow to bedrock to allow good rooting systems for trees. Wind uproots many of them before they reach marketable size. Some of the largest areas of this soil are northeast of Mentone and Ider. As mapped, this soil includes areas of Muskingum soil that occupy some of the stronger slopes.

Use and suitability (IVe–4).—Only a small part of Crossville rocky loam, rolling phase, has been cleared for pasture; practically none is used for crops. A few small areas have been improved under recommended pasture programs, but much of the soil is in unimproved pasture.

This soil has only fair workability. It is moderately erodible. Response to good management practices is very good.

DEWEY SERIES

The soils of the Dewey series are on uplands in the limestone valleys. These soils are distinguished by their brown to reddish-brown surface soils, reddish-brown subsoils, and great depth to limestone bedrock. They are associated with Fullerton, Talbott, Hermitage, and Etowah soils. The parent material is residual from high-grade limestone that contains some chert in places.

Locally, dolomitic limestone, shale, and colluvial wash have contributed to the parent material. In De Kalb County these soils do not greatly differ from the Hermitage soils, which were derived entirely from colluvial material.

The soils of the Dewey series are medium to strongly acid, contain a moderate quantity of organic matter, and are medium to high in fertility. Permeability is moderate in the surface soil and moderately slow in the subsoil.

The Dewey soils are medium to high in productivity and have a wide to medium range of suitability. They are used almost exclusively for crops.

Dewey silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Db).—This soil has lost half or more of its original surface soil through erosion. The present plow layer consists of remnants of the virgin surface soil mixed with material from the upper part of the subsoil that was brought up by tillage.

This soil has medium runoff and internal drainage. The moisture-holding capacity generally is moderate. In places erosion has reduced the quantity of moisture absorbed, and as a result the soil does not retain enough moisture for good plant growth. The native vegetation was largely a mixture of deciduous hardwoods and pines in which the hardwoods were dominant.

Profile description:

Surface soil—
- 0 to 5 inches, brown to reddish-brown friable silty clay loam; plastic and sticky when wet; moderate fine granular to medium granular structure.

Subsoil—
- 5 to 12 inches, reddish-brown friable silty clay loam; dark brown when wet; light red when dry; weak fine subangular blocky to medium subangular blocky structure.
- 12 to 48 inches, red firm silty clay; light red to reddish yellow when dry; sticky and plastic when wet, hard when dry; moderate medium subangular blocky to coarse subangular blocky structure.

Parent material—
- 48 inches +, reddish-yellow residuum from high-grade limestone.

The depth to bedrock ranges from 8 to 20 feet. Some chert occurs in most areas, especially in the lower part of the subsoil. On Pudding Ridge in Deer Head Cove, the soil is somewhat redder and more spongy. It is probable that here the parent material contained considerable material derived from shale.

A few included areas are severely eroded. On these, the present surface layer consists almost entirely of subsoil material. They are indicated on the soil map by symbol. A small acreage is also included that is undulating (slopes of 2 to 5 percent).

Use and suitability (IIIe–1).—All the inextensive acreage of Dewey silty clay loam, eroded rolling phase, has been cleared for cultivation. Most areas are small. The soil is used mainly for annual row crops, chiefly cotton and corn. On Pudding Ridge in Deer Head Cove, a large acreage has been used for peach and apple orchards. Most of the orchards are now being abandoned or destroyed because of tree diseases, and the land is being planted to row crops. The soil is well suited to pasture, and some of the more strongly rolling and severely eroded areas are being developed for improved pasture. Sericea lespedeza does very well on the rolling areas.

Workability of this soil is good, but erosion has impaired tilth and moisture absorption and has increased the problems of moisture conservation. The hazard of further erosion is moderate.

The response of this soil to good management is medium. Most of the severely eroded areas can be reclaimed for pasture or crops. The included undulating areas can be used for alfalfa, if they are properly limed and fertilized before the crop is seeded and are otherwise well managed.

Dewey silty clay loam, eroded hilly phase (12 to 25 percent slopes) (Da).—This soil resembles Dewey silty clay loam, eroded rolling phase, in most profile characteristics and in parent material, but it occurs on stronger slopes. Runoff is rapid, and internal drainage is medium. The moisture-holding capacity of the soil is generally moderate. The rapid runoff, however, prevents absorption of moisture, and the soil tends to be droughty during dry spells in the growing season.

Erosion has removed 50 to 75 percent of the original surface soil. The present plow layer is a mixture of remnants of original surface soil and subsoil material brought up during tillage. The plow layer consists of brown to reddish-brown friable silty clay loam. The subsoil is reddish-brown friable silty clay loam in the upper 7 inches and red firm silty clay in the lower 30 inches.

Use and suitability (IVe–1).—Most of this inextensive soil has been cleared and used for crops. It is most commonly used for row crops, chiefly corn and cotton. The soil is fairly well suited to pasture of sericea lespedeza, but very little of this pasture has been established. Some areas are idle or in range pasture; a few have reseeded voluntarily, mainly to pines. The somewhat isolated more severely eroded areas are best used for pine trees.

This soil has only fair workability. The hazard of further erosion is moderate to high. The response of this soil to good management is medium.

DOWELLTON SERIES

The soil of the Dowellton series is characterized by very slow internal drainage and a very firm clay subsoil that is plastic to very plastic when wet. The soil of this upland series was derived from residual material of highly clayey limestone and calcareous clay shale. It occurs on level or nearly level positions in the limestone valleys. The slopes seldom exceed 2 percent, although they may exceed 4 percent on very narrow strips that have sharp breaks. These strips are usually associated with outcropping ledges of limestone bedrock.

This soil is slightly to strongly acid and low in its supply of organic matter. It has medium fertility. The surface soil and subsoil are very slowly permeable. The moisture-holding capacity is low.

The productivity of this soil is low, and the range of suitability is narrow. The soil is used principally for pasture and crops.

Dowellton silty clay loam (0 to 2 percent slopes) (Dd).—This soil has a moderately fine to fine textured surface soil of very firm consistence. The subsoil is fine textured and mottled. Dowellton silty clay loam is closely associated with the Colbert soils.

Runoff is slow, and internal drainage is very slow. The native vegetation is mainly water-tolerant hardwoods and redcedar. The hardwoods include post and

water oaks, hickory, persimmon, ash, elm, hackberry, and gum. Most of the relatively small total extent of this soil is in Big Wills Valley.

Profile description:

Surface soil—
- 0 to 5 inches (plow layer), brown to pale-brown friable silty clay loam to clay; light brownish gray when dry; weak fine angular blocky to medium angular blocky structure.

Subsoil—
- 5 to 15 inches (claypan), very firm clay faintly to distinctly mottled light brownish gray, olive yellow, and light olive brown; very plastic when wet; moderate fine blocky structure.
- 15 to 22 inches, pale-olive or olive-yellow very firm clay faintly mottled with shades of gray and brown; plastic when wet.

Parent rock—
- 22 inches +, highly clayey limestone and calcareous clay shale.

In virgin or grassland areas, the surface soil in the upper 3 inches is dark grayish-brown to olive-brown friable silty clay that is sticky when wet. This layer contains considerable organic matter. It has weak medium to fine angular blocky structure. The depth of this soil to bedrock varies from 1½ to 2½ feet. Average depth is hard to determine, however, because the limestone bedrock rises rather gradually and forms ledges in places. The soil is fairly deep between the ledges. The profile is free from chert in most places, although it is very cherty in others. Some small areas near breaks that have undulating relief are included with this soil.

Use and suitability (IVw–1).—Most of this soil has been cleared for crops. Corn was once the chief crop, but in recent years pasture has become the most common use.

This soil has poor workability. The range of moisture conditions under which it can be cultivated is narrow. It puddles very easily if worked when too wet and becomes too hard when dry. Nevertheless, if the soil is plowed or turned in fall, even under adverse conditions, the surface layer generally crumbles to a fairly mellow seedbed by spring. The hazard of erosion is slight.

In areas where there are few or no rock outcrops, the soil is fairly well suited to corn and to soybeans for hay. In wet years, however, yields may be poor. This soil is not very well suited to cotton because it warms late in spring.

In most areas numerous limestone ledges interfere with tillage. Such areas are best suited to pasture. The soil is well suited to grasses and whiteclover. Fescue and Ladino clover are good pasture plants, and other mixtures have proved fairly successful. In general, the soil is not well suited to winter cover crops because of the level or nearly level surface and very slow moisture absorption. Areas that are sufficiently well drained, or that are where adequate surface drainage can be provided, may benefit by cover crops grown for green manure. This soil makes little response to good management.

DUNNING SERIES

The soil of the Dunning series is characterized by its dark-colored surface soil and fine texture throughout the profile. It occupies level or nearly level and slightly depressed areas along lateral drains that receive the surplus runoff from Rockland, limestone, steep. The parent material is alluvial and consists of limestone residuum washed from rocky limestone slopes; from Rockland, limestone, steep; or from Colbert soils.

The soil is slightly alkaline to slightly acid. It is high in supply of organic matter and is also high in fertility. The surface soil is slowly permeable, and the subsoil is very slowly permeable. The moisture-holding capacity is high.

Productivity of the soil is medium, and the range of suitability is narrow. The soil is used mostly for pasture and forest.

Dunning silty clay (0 to 2 percent slopes) **(Dc)**.—This poorly drained soil has a dark grayish-brown to olive-brown surface soil and a faintly mottled subsoil. It occurs on first bottoms along streams in limestone valleys and is subject to overflow at times. Under natural drainage conditions, the water table is very high through winter and during wet periods in other parts of the year. This soil is commonly associated with Rockland, limestone, steep; Stony smooth land, Talbott and Colbert soil materials; Stony rolling land; and Colbert soils.

Runoff is slow, and internal drainage is very slow. In most places excess surface water can be removed by artificial drainage before it injures pasture grasses and other plants. Underdrainage cannot be very easily improved. This soil has developed under a forest-and-grass vegetation. Some areas now support nearly solid stands of redcedar, especially where shallow swales extend into Stony smooth land, Talbott and Colbert soil materials.

Profile description:

Surface soil—
- 0 to 7 inches, dark grayish-brown to olive-brown friable to firm silty clay; sticky and plastic when wet.

Subsoil—
- 7 to 24 inches, light olive-brown to olive-brown, firm, stiff clay faintly mottled with shades of gray and brown; pale olive to olive when dry; plastic when wet; the material is very hard when dry, and large downward cracks develop.

Underlying material—
- 24 inches +, mottled alluvium consisting chiefly of silt and clay.

The color ranges from black or very dark gray to dark olive gray in the surface soil and from dark gray to olive in the subsoil. In some places the color of the surface soil is mottled to various degrees.

As mapped, this soil includes areas of Hollywood silty clay. This included soil usually borders Dunning silty clay, but it lies somewhat higher and is slightly better drained. Its surface soil and the upper part of its subsoil also are more uniformly dark olive gray, very dark gray, or black. Otherwise, the two soils are similar.

Use and suitability (IVw–1).—The small aggregate area of Dunning silty clay is used chiefly for pasture and forest. A small part is used for row crops, chiefly corn and soybeans for hay.

The soil has poor workability. The hazard of erosion is slight. Under present farm programs the soil is best suited to pasture, especially fescue and Ladino clover. Areas used for row crops are best suited to corn and soybeans for hay. The response of this soil to good management is medium to very good. Management practices should include adequate drainage for the crops commonly grown in the county.

ENNIS SERIES

The soils of the Ennis series are somewhat similar to soils of the Huntington series. They are, however, somewhat less well drained and paler brown, and they usually have a lower percentage of clay in their parent material. This material is alluvium washed largely from soils underlain mainly by chert or cherty limestone and cherty dolomite. The soils formed mainly from material washed directly or indirectly from the central ridge. The central ridge consists of cherty material derived from the Chepultepec and Copper Ridge dolomites. Very little of the parent material originated from the Fort Payne chert on the eastern and western ridges, mainly because this chert occurs in narrow belts and no first bottoms have developed distinctly from its material. Usually the Ennis soils, especially in the cherty areas, are associated with Greendale soils in the upper part of the valley. Ennis silt loam develops where the alluvium is less cherty; farther downstream it grades into Huntington silt loam.

The Ennis soils are medium acid and medium to high in fertility. They are moderately well supplied with organic matter. Permeability is moderate to moderately rapid, and the moisture-holding capacity is moderate to high.

These soils are high to medium in productivity and have a wide range of suitability. They are used principally for crops and pasture.

Ennis silt loam (0 to 2 percent slopes) (Eb).—This light-colored, moderately well drained soil occurs on first bottoms along streams in limestone valleys. Although the general relief is 0 to 2 percent, most of the first bottoms are broken somewhat by old or intermittent channels and low hummocks that make short, sharp breaks. Because of such relief, the speed of the floodwaters that carry the parent alluvium across the flood plain varies greatly, and coarse materials are deposited in one place and fine materials in another. The alluvial material, however, is usually more uniform farther down the valley. Practically all of this soil has been cultivated, and the minor surface irregularities have been smoothed out.

Runoff is very slow to slow. It is usually adequate to remove excess surface water after the flood stage has passed. Internal drainage is generally medium. It may be somewhat slow in the underlying material, as is indicated by mottling or splotches. The water table remains high during the wet winter season and usually during prolonged wet periods in other seasons. However, the fairly open and porous soil permits the water table to fall rapidly, and the main channels are deep enough to provide outlets for ground water after floods.

The original forest consisted mainly of deciduous hardwoods. It had a fairly high percentage of water oak, hickory, elm, tulip-poplar, maple, willow, and sycamore. Some pines and redcedars were also in the stand.

Profile description:

Surface soil -
: 0 to 10 inches, brown very friable silt loam; pale brown or light yellowish brown to white when dry; weak fine crumb structure.

Subsurface—
: 10 to 30 inches, yellowish-brown very friable silt loam; stratified in the lower part; light yellowish brown when dry; weak fine crumb structure.

Underlying material—
: 30 inches +, mostly chert fragments.

The depth of the soil to bedrock is 4 feet or more. The parent alluvium ranges in texture from a more or less well assorted silt loam to a cherty silt loam. Some areas are fairly cherty in spots but nearly free from chert in others. Most areas are underlain by beds of fine to coarse chert gravel at depths ranging from about 30 inches to more than 48 inches. The color of the surface soil ranges from brown to light brownish gray, and that of the subsoil ranges from yellowish brown to reddish brown. The lower part of the subsurface layer and the underlying material are more or less splotched or mottled. This soil includes some Greendale cherty silt loam. The included soil has similar parent material and occurs on very closely associated colluvial slopes.

Use and suitability (IIw–2).—The small total area of this soil is cultivated and used mainly for corn. Cotton, soybeans, sorghum, potatoes, sweetpotatoes, and oats are grown on minor acreages.

The soil has excellent workability, good to excellent tilth, and very good moisture-absorbing qualities. Erosion usually is not a problem, but some protection to crops and soil may be necessary on areas subject to frequent floods.

The inherent fertility is high, and the response of this soil to proper fertilization and other good management practices is only medium. If management practices are good, the soil is well suited to pasture grasses and whiteclover. Winter legumes are usually less well suited because of the high water table in this soil and the frequent floods.

Ennis cherty silt loam (0 to 2 percent slopes) (Ea).—This soil differs from Ennis silt loam principally in having a larger quantity of chert fragments in the surface soil. It occurs mainly in narrow flood plains along the creeks that cut through the middle ridge and along small drains that originate on this ridge. The parent material is, for the most part, recent general alluvium washed from cherty soils or directly from chert ridges. It contains a considerable amount of sand, especially in areas along the creeks that cut through from Sand Valley. The alluvium varies greatly from one flood plain to another and even from one place to another in the same flood plain. The level or nearly level relief is broken by short intermittent channels, old channels, and low hummocks having short sharp breaks.

The surface soil is about 10 inches thick and consists of brown very friable cherty silt loam. The subsurface is yellowish-brown very friable silt loam about 10 inches thick. The substratum is composed almost entirely of chert fragments.

Runoff is very slow to slow. The small stream channels that cut some areas, however, help carry off surplus water. Internal drainage is medium, but it may be somewhat slow in swales or slightly ponded areas.

Use and suitability (IIw–2).—Only a small part of this inextensive soil has been used for crops. Most areas have been cleared or partly cleared for pasture. Some areas, especially those previously cultivated, are being improved for pasture by seeding Ladino clover and fescue. A very small acreage is planted with corn, soybeans for hay, sorghum, and other minor crops. The cultivated land usually occupies fairly wide fans in the lower part of the valleys, where the soil grades into Ennis silt loam or Huntington silt loam. In places it

spreads out into lower lying and more poorly drained soils.

This soil is easily worked, and the hazard of erosion is slight. Its response to good management is very good.

ETOWAH SERIES

The soil of the Etowah series occurs on high stream terraces in limestone valleys. It is characterized by a dark-brown very friable surface soil and a strong-brown through yellowish-red to reddish-yellow friable to firm subsoil. The alluvial parent material of the soil has washed from uplands underlain chiefly by limestone but in places by sandstone and shale.

The soil is medium to strongly acid. It contains a moderate supply of organic matter and has medium to high fertility. It is moderately permeable and has a high moisture-holding capacity.

The productivity of the soil of this series is high. The soil has a very wide range of suitability. It is used almost entirely for crops.

Etowah silt loam, eroded undulating phase (2 to 5 percent slopes) (Ec).—Although this soil is generally undulating, small areas are level or nearly level (0 to 2 percent slopes) and some are rolling (5 to 12 percent slopes).

Runoff is generally slow to medium, but it is rapid on some of the rolling areas. Internal drainage is medium in most areas. Mottling in the subsoil would indicate that internal drainage may be retarded in the few level or nearly level places and in the comparatively low-lying areas.

The soil developed under a forest consisting predominantly of deciduous hardwoods. Scattered pines and redcedars grew in places. Most areas of this relatively extensive soil are small, but some fairly large acreages occur in the south-central and southern parts of Big Wills Valley.

Profile description:

Surface soil—
- 0 to 7 inches, dark-brown very friable silt loam; light yellowish brown when dry; weak fine granular structure.

Subsoil—
- 7 to 26 inches, strong-brown to yellowish-red friable silty clay loam; reddish yellow when dry; sticky when wet; weak fine blocky to medium blocky structure.
- 26 to 38 inches, strong-brown to reddish-yellow firm to friable heavy silty clay loam or silty clay; sticky when wet; hard when dry; moderate fine subangular blocky to medium subangular blocky structure.

Underlying material—
- 38 to 48 inches, variegated strong-brown and reddish-yellow firm silty clay loam to silty clay; yellow when dry.

The depth of the soil to bedrock is from 4 to 20 feet. The color of the surface soil ranges from yellowish brown to reddish gray or dark reddish brown. That of the subsoil ranges from yellowish brown to reddish brown. The texture of surface soil generally is silt loam, but it ranges from loam to silty clay loam.

Included with this soil is a small acreage of Cumberland silt loam, eroded undulating phase. This inclusion was formed from the same kind of parent material as the Etowah soil. It has a brown to reddish-brown friable silt loam surface soil. The subsoil is dark-red or reddish-brown firm to friable silty clay to heavy silty clay loam. Erosion has removed much of the original surface soil.

Use and suitability (IIe-1).—Etowah silt loam, eroded undulating phase, is used for all crops commonly grown in the county. Corn and cotton are most extensively grown. For the most part, the soil is considered too desirable for crops to be used for improved permanent pasture. In recent years, however, many small areas have been improved for pasture with excellent results. Fescue and Ladino clover are usually grown. Winter legumes are commonly used in rotation with row crops with good results. A few small blufflike breaks can be used best for permanent pasture, especially if they are associated with other soils well suited to pasture, or if they have little value for tilled crops.

This soil has very good workability, good to excellent tilth, and very good moisture absorption. It is not difficult to conserve, except on the included rolling positions and some of the stronger sloping undulating areas. Excess runoff, however, can be controlled on most areas by terraces. The response of this soil to good management is medium.

FULLERTON SERIES

The Fullerton series consists of soils developed on uplands from highly leached very cherty material. This material was derived from residual products of cherty dolomitic limestone. In De Kalb County the Fullerton soils on the eastern and western ridges were developed over Fort Payne chert, and those on the central ridge or ridges were developed over Chepultepec and Copper Ridge dolomitic limestones.

Soils of the Fullerton series occupy tops and upper slopes of chert ridges. They are closely associated with Clarksville soils of the chert ridges and with Minvale, Pace, Greendale, and Hermitage soils of the colluvial lands. In this county the steep areas of Fullerton soils are included with the Clarksville soils. The Fullerton soils developed generally under deciduous hardwood forest. Scattered pines and redcedars occurred in places.

Most areas of these soils are cherty. Large blocks of chert occur in places, especially on the middle ridges. Some areas are nearly free from coarse chert in the surface soil, especially where the original soil has not been tilled. These areas are small, and delineation on the soil map is not practical.

In general the cherty surface soils of this series have favorable moisture absorption. Chert tends to decrease surface evaporation, but the fragments in the soil profile lessen its moisture-holding capacity. The hard flinty fragments in particular have very little absorption space. Conservation of soil and moisture usually is not difficult on undulating and gently rolling positions. It becomes more difficult, however, as the slope gradients increase.

The soils are leached of all soluble carbonates and are low in inherent fertility. Apparently they are not so severely leached of plant nutrients as the associated Clarksville soils.

Fullerton soils are medium to strongly acid and have a low supply of organic matter. Except for the severely eroded hilly phase, permeability is moderately rapid in the surface soil and moderately slow in the subsoil. The moisture-holding capacity is generally moderate.

The Fullerton soils are medium to low in productivity and have a wide to narrow range of suitability. They

are used chiefly for forest, crops, and pasture. Some areas are idle.

Fullerton cherty silt loam, rolling phase (5 to 12 percent slopes) (Fd).—This light-colored, well-drained soil is characterized by its chert content. The chert fragments vary in size from place to place, but very coarse fragments occur in only a few areas. Runoff and internal drainage are medium. The moisture-holding capacity is low. Areas of this fairly extensive soil are mostly small and are widely distributed throughout the chert ridges.

Profile description:

Surface soil—
0 to 8 inches, grayish-brown friable cherty silt loam; weak fine crumb structure.

Subsoil—
8 to 28 inches, yellowish-brown friable cherty silty clay loam to cherty clay, grading with depth to yellowish-red and strong-brown friable cherty silty clay or cherty clay; very pale brown to pink when dry; sticky and plastic when wet, hard when dry; moderate medium subangular blocky structure.
28 to 42 inches, red or yellowish-red, firm, stiff cherty clay; reddish yellow when dry; moderate to strong medium blocky structure; structure units show distinct cleavage lines and coatings; angular chert fragments are abundant.

Parent material—
42 inches +, variegated cherty residuum weathered from cherty dolomitic limestone.

Depth of the soil to bedrock ranges from 16 to 40 feet.

Use and suitability (IIIe–2).—Most areas of this soil are in forest. The trees have been cut from time to time. The soil is used increasingly for sericea lespedeza pasture. Areas are cleared and worked to fairly good seedbed for this crop. Some farmers sow crimson clover for the first grazing crop.

This soil has good workability. Erodibility is moderate. The response to good management is very good.

Fullerton cherty silt loam, eroded rolling phase (5 to 12 percent slopes) (Fb).—This soil is similar to Fullerton cherty silt loam, rolling phase, in profile characteristics, but it has been cleared and cropped. As a result, it has lost half or more of the original friable surface soil. The present plow layer is grayish-brown to yellowish-brown friable cherty silt loam. Runoff and internal drainage are medium.

A few small areas of Fullerton cherty silty clay loam, severely eroded hilly phase, are included. In these areas nearly all, or all, of the friable surface soil has been lost through sheet and shallow gully erosion. In places some of the subsoil has been eroded. The present plow layer consists of yellowish-brown to yellowish-red and strong-brown friable cherty silty clay loam. These severely eroded areas are indicated on the soil map by symbol.

Use and suitability (IIIe–2).—All of the fairly extensive areas of Fullerton cherty silt loam, eroded rolling phase, have been cultivated at some time. Most of the soil is now used for row crops, chiefly corn and cotton. Some areas are in pasture. A few idle fields are reseeding voluntarily, mainly to pine. Very little of the soil has been replanted to pine or other seedling trees.

This soil is easily worked. It is moderately erodible. Erosion has impaired workability and tilth and has reduced moisture absorption, supply of organic matter, and resistance to drought. Properly constructed terraces would help check further erosion and conserve moisture.

The soil is suited to winter legumes for grazing and for green manure. These crops tend to reduce erosion. This soil should not be used principally for row crops. If additional grazing is needed, it can be used advantageously for improved sericea lespedeza pasture. For winter and early spring grazing, crimson clover has proved satisfactory. Response of this soil to good management practices is very good.

Fullerton cherty silt loam, hilly phase (12 to 25 percent slopes) (Fc).—This soil is closely associated with Clarksville and Litz soils and with other members of the Fullerton series. It is similar to Fullerton cherty silt loam, rolling phase, but has stronger slopes and shallower depth to bedrock. Because of the stronger slopes, runoff and erosion are increased and water absorption is decreased. The parent material is rather uniform in most areas. However, where the soil is closely associated with Litz soils, which are mainly from shale, the parent material varies more and has a more complex composition. On Pudding Ridge in Deer Head Cove, this hilly phase and the hilly and steep phases of Litz soils are associated so closely that their delineation on the soil map is arbitrary in some places. This hilly phase and the Clarksville hilly phases are likewise closely associated on some of the chert ridges.

Runoff is rapid on this hilly soil. Internal drainage is medium. Narrow ridge crests and small benches with slopes of less than 12 percent are included, as well as steep breaks with slopes greater than 25 percent.

Use and suitability (IVe–2).—Most areas of this fairly extensive soil have never been cleared, but timber has been cut in some places. A few areas, especially on Pudding Ridge, have some nearly solid stands of redcedar. The present forest probably contains more pine than the original forest.

Workability is only fair because of strong slopes and the presence of large chert fragments in the soil. Tilth is poor on most areas, but it is fairly good where the soil is comparatively free from coarse chert. The soil is difficult to conserve, although the chert fragments tend to retard erosion to some extent. This soil responds very well to good management. Cleared areas can be developed into sericea lespedeza pasture. In general, the best use for this soil is forest. A higher percentage of pine is desirable in the forest, because pine species grow reasonably fast and have a good sale value.

Fullerton cherty silt loam, eroded hilly phase (12 to 25 percent slopes) (Fa).—This phase consists of hilly areas of Fullerton cherty silt loam that have lost 50 to 75 percent of their original friable surface soil through sheet erosion. The erosion occurred after the soils were cleared for crops. Shallow gullies have formed in places. Runoff is rapid, and internal drainage is medium. Although the general slope range is 12 to 25 percent, more of this soil has slopes below 16 percent than above. For the most part, areas used for crops occupy relatively mild slopes.

The present plow layer is grayish-brown friable cherty silt loam, but in many places it contains material plowed up from the subsoil. The transition from the plow layer to the subsoil is very abrupt.

Use and suitability (IVe–2).—This soil is used mainly for row crops; corn and cotton are most extensively grown. Small patches of minor row crops are fairly common. Close-growing annual crops usually are not

grown. Some areas are fenced and used for range pasture, but the grazing is scanty. A few areas are idle.

The soil has only fair workability. It is moderately to highly susceptible to further erosion. Practically all cultivated areas are worked on the contour. Most of them have been terraced to some extent, and some terraces are kept in fairly good condition. Most areas, however, are damaged annually by erosion.

Such close-growing crops as hay and small grains are unsatisfactory, even if yields are heavy, because they are difficult to harvest. Pasture of sericea lespedeza rotated occasionally with corn or cotton is suitable for this soil. Crimson clover seeded in July or early in August has proved fairly satisfactory for winter and early spring grazing. The response of this soil to good management is very good.

Fullerton cherty silty clay loam, severely eroded hilly phase (12 to 25 percent slopes) (Fe).—This soil is somewhat excessively drained. It has lost all or nearly all of its original cherty silt loam surface soil and, in places, part of its subsoil. Shallow and deep gullies have developed in some places. The present plow layer consists almost entirely of subsoil material. The transition from the plow layer to the subsoil is very abrupt. Runoff is rapid, and the quantity of moisture absorbed is small except in protracted wet periods such as those occurring in winter. Internal drainage is medium. Permeability is moderately slow, and the moisture-holding capacity is low.

The present plow layer consists of yellowish-brown to yellowish-red friable cherty silty clay loam or silty clay. The upper part of the subsoil is yellowish-brown friable cherty silty clay loam to cherty clay; it grades with depth into yellowish-red and strong-brown friable cherty silty clay or cherty clay. This layer is about 7 inches thick. The lower part of the subsoil is red or yellowish-red, firm, stiff cherty clay about 14 inches thick. The depth to bedrock ranges from 10 to 30 feet.

Use and suitability (VIe–1).—The relatively small total area of this soil is idle or reseeding to forest, principally pine. Some areas have been fenced and are used for pasture. A few have been terraced and improved by planting sericea lespedeza pasture.

The soil is difficult to work; there is danger from further erosion. Pasture of sericea lespedeza may be desirable, but a well-established system of terraces and outlets for excess surface water are needed to control erosion. The response of this soil to good management is very good.

GREENDALE SERIES

The soil of the Greendale series is light colored and cherty. It was derived from recently accumulated colluvium and alluvium that washed principally from cherty soils underlain mainly by chert or cherty limestone. These accumulated materials range in texture from well-assorted loose floury silt to friable cherty silty clay loam or cherty clay loam. The soil is closely associated with Fullerton, Clarksville, Minvale, and Pace soils and, in places, with Colbert, Talbott, and Hermitage soils. It resembles Pace soils in color and positions occupied. However, its profile has little or no textural development, as compared with the fairly well developed to well developed textural profile of the Pace soils.

Greendale soil is medium to strongly acid. Its supply of organic matter is low and its fertility is medium to low. Permeability is moderately rapid, and the moisture-holding capacity is high to moderate.

The soil is medium in productivity and has a wide range of suitability. It is used principally as cropland.

Greendale cherty silt loam (0 to 6 percent slopes) (Ga).—This is a well drained to moderately well drained grayish-brown friable soil. Although slopes generally range from 0 to 6 percent, they seldom exceed 4 percent. The stronger slopes usually occur as narrow, sharp belts adjoining higher or lower lying soils.

This soil occupies positions around drainage heads, in shallow depressions in and near uplands and colluvial slopes, on colluvial fans, and at the base of slopes. The areas at the base of slopes occur in narrow belts. If the slopes converge toward a common drain, these areas may be continuous from the base of one slope to the base of the opposite slope.

Runoff is slow to medium. In general, internal drainage is medium, although it is slow in some nearly level areas. It is frequently slow at the base of slopes where seepage keeps the water table fairly high during winter and other wet seasons. This soil did not have a native forest cover, because its parent material was washed from soils on surrounding hills and slopes after they were cleared for crops.

Profile description:

Surface soil—
- 0 to 8 inches, grayish-brown very friable cherty silt loam; very pale brown to light gray when dry; weak medium crumb structure; contains much grit, a great many fine cherty fragments ½ inch or less in diameter, and many coarse chert fragments as large as 3 inches in diameter.

Subsurface -
- 8 to 16 inches, light yellowish-brown friable cherty silt loam to cherty silty clay loam; pale brown when dry; sticky when wet, hard when dry.
- 16 to 30 inches, grayish-brown firm to friable cherty silty clay loam mottled with shades of brown, yellow, and gray in the lower part; sticky when wet; color of crushed dry material is white or light gray.

Underlying material—
- 30 to 40 inches, mottled grayish-brown, yellowish-brown, strong-brown, and yellowish-red friable cherty clay loam; sticky when wet; dry lumps crush easily into a pale-brown or very pale-brown mass of gritty material.

Depth of the soil to bedrock ranges from 5 to 12 feet. The quantity and size of the chert fragments in the soil and on the surface varies from place to place. In some areas the fragments are 6 inches or more in diameter. The dry surface soil is reddish gray or reddish brown where it receives considerable red soil material washed from the subsoil of Fullerton, Minvale, Hermitage, Dewey, and Talbott soils. The underlying or buried soil resembles Pace cherty silt loam in places. Elsewhere it consists mainly of fine fairly well-assorted material similar to that of Melvin silt loam.

Use and suitability (IIw–1).—Most of the relatively small acreage of Greendale cherty silt loam is used for crops. The positions occupied are generally favorable for crops without artificial drainage. Corn is chiefly grown, and yields are usually better on the less cherty areas. Some of the higher lying soil is used for cotton.

In general the workability of this soil is good. It is somewhat difficult on very coarse cherty areas, unless most of the coarse chert is removed from the surface

and the surface soil. Tilth ranges from fairly good to poor. Moisture absorption is good. Although moisture-holding capacity is high to moderate, those areas having much coarse chert may become droughty where they adjoin fairly deep drains. Erosion is slight to moderate.

This soil is moderately suited to winter legumes in most areas, but it is poorly suited in level places or slight depressions if the water table is high. The soil is fairly well suited to improved pasture. It should not be overdrained. For pasture grasses and white clover, the only drainage necessary is the removal of excess surface water to prevent standing water from choking out the plants. The response of this soil to proper management is good.

GULLIED LAND

Gullied land (5 to 25 + percent slopes) (Gb).—This excessively drained miscellaneous land type is associated mainly with Allen, Colbert, Hermitage, Litz, Sequoia, Tellico, Talbott and other soils used for crops in the limestone valleys. A few areas on Sand and Lookout Mountains are associated with cultivated areas of Apison, Hartsells, and Linker soils.

More than half of the acreage is so mutilated by gullies that very little of the original soil profile remains. In most areas the gullies are deep and have displaced considerable parent soil material. In many soils of the limestone valleys, particularly those developed from old colluvium and from deep beds of fissile shale, the parent soil material is deep. In other areas, especially those on the sandstone plateaus and in Colbert and Talbott soil areas in limestone valleys, this material is shallow to bedrock.

The relief ranges from rolling to steep. Runoff is very rapid and internal drainage is medium to slow. This land type is medium to strongly acid, very low in supply of organic matter, and low in fertility. It is slowly permeable and has a low moisture-holding capacity.

Use and suitability (VIIe–1).—Most of the relatively small acreage of Gullied land is idle or is reverting to forest, mainly pine. Some areas are in range pasture, but the voluntary grasses and other plants furnish limited grazing.

Workability is very poor. The hazard of further erosion is very high. Areas that are shallow to bedrock are very difficult to reclaim. Those that are deep to bedrock are difficult to moderately easy to reclaim. How well the areas of this land type can be reclaimed depends largely on the texture, structure, and consistence of the soil materials, and the gradient of the slopes. In general, soil developed from friable materials is restored more easily than soil developed from heavy clays. Some included severely eroded Litz soils are very shallow to blocky fissile shale. These soils can be reclaimed for satisfactory pasture.

Areas of Gullied land are reclaimed by filling the gullies and smoothing the ridges with heavy machinery. Other areas are terraced to prevent excessive runoff and to allow the soil material to become stabilized so that new soil can develop. The best use for reclaimed land is permanent pasture. Under careful management, the pasture can be rotated occasionally with row crops as an aid to soil development. Because of demands for timber and the expense of soil reclamation, most of Gullied land on steep slopes or on those areas shallow to bedrock should be left in forest. Most areas will seed voluntarily to pine, but some may require the planting of seedlings.

HAMBLEN SERIES

The soil of the Hamblen series is light colored and somewhat poorly drained. It has formed from recent local alluvium and colluvium deposited in limestone valleys. It contains a fairly high percentage of sand derived directly or indirectly from the Pottsville formation and the Red Mountain or Tellico sandstone formation.

Hamblen soil resembles Lindside soil in drainage and color but differs mainly in source of parent material. The parent material of the Hamblen series has been washed from soils derived largely from residual material of acid sandstone and shale and, to some extent, calcareous rocks.

The Hamblen soil is medium acid to neutral. The supply of organic matter is moderate, and fertility is medium to high. The soil is moderately permeable, and its moisture-holding capacity is high.

The soil is high in productivity. It has a medium range of suitability and is used principally for crops and pasture.

Hamblen loam, local alluvium phase (0 to 2 percent slopes) (Ha).—This soil occurs in depressions, around drainage heads, and near the base of slopes in limestone valleys. This phase is similar to the local alluvium phase of Staser loam in texture and character of parent material, but it occupies more poorly drained positions. In color and drainage it is similar to Ooltewah silt loam, but it differs in texture.

Runoff is very slow. Internal drainage is slow if artificial outlets have not been provided. With better outlets, the internal drainage is greatly improved, particularly in the loose friable surface soil. The soil has no true native forest cover because its parent materials accumulated after erosion became active on surrounding higher soils. The areas of this soil are mostly small and are widely distributed.

Profile description:

Surface soil—
- 0 to 20 inches, brown to dark grayish-brown very friable loam to very fine sandy loam; pale brown when dry; weak medium crumb structure.

Subsurface -
- 20 to 40 inches, mottled light yellowish-brown and light-gray friable loam or sandy clay loam; grades to sandy clay as the depth increases; pale yellow faintly mottled with dark brown and yellowish brown when dry; sticky when wet; weak medium blocky structure.

Underlying material—
- 40 inches +, mottled friable alluvium and colluvium composed chiefly of sand, silt, and clay.

The surface soil varies in color and texture. In some places it gets its color from that of the soil from which its parent material washed. It varies from light brown to reddish gray in cultivated areas, but it is usually much darker where covered by grass. The texture ranges from a loamy sand in some places to a sandy clay loam in others, but it generally ranges from a loam to a fine sandy loam. In some places the colors of the subsurface layer are gray, yellowish brown, or dark gray. Texture of the subsurface layer ranges from

heavy sandy loam to sandy clay or silty clay. In some places the subsurface layer in the loam or fine sandy loam areas is very similar to the subsoil of Ooltewah silt loam.

Use and suitability (IIw–1).—Most of this soil has been drained by open ditches and is used annually for row crops, hay, or pasture. Corn is the chief crop. The total acreage in soybeans for hay is second to that in corn. Smaller areas are used for sweet sorghum, field peas, annual lespedeza, and potatoes. If suitably located, fairly well drained areas are planted to home gardens. Most of the undrained areas are in pasture or are idle.

The soil is easily worked. Erosion control is no problem. The response to good management is medium.

HARTSELLS SERIES

The Hartsells series is the most extensive in the county. It consists of light-colored, well-developed, moderately coarse textured loamy soils. These soils were developed on material weathered from sandstone and conglomerate, and in places from acid shale. The texture of the sandstone ranges from fine grained to moderately coarse grained; the consistence ranges from hard to relatively soft. The conglomerate and most of the sandstone is rather massive or thick bedded. In places the sandstone is in beds ½ to 8 inches thick. Most of the sandstone quarried for building rock is this type.

The Hartsells soils are closely associated with the Linker, Apison, Crossville, and Muskingum soils. They are the dominant soils on Lookout, Sand, and Fox Mountains. They differ from the Linker soils mainly in having subsoils that are less red, and from Apison soils in parent material. The Apison soils have parent material that was derived dominantly from interbedded sandstone and shale, sandy shale, and siltstone. The Hartsells soils differ from Crossville soils mainly in color but to some extent in texture and consistence. The Crossville soils are browner in color, finer in texture, and somewhat firmer in consistence.

In scattered areas the texture of the surface soil ranges from light fine sandy loam to a very fine sandy loam. In most areas it is uniformly fine sandy loam. The texture of the subsoil ranges from fine sandy loam to fine sandy clay, but it is most commonly fine sandy clay loam. The consistence of the subsoil is predominantly friable.

Hartsells soils that developed from parent material derived largely from conglomerate may be fairly gravelly and have considerable waterworn quartz gravel on the surface and throughout the profile. Because the conglomerate seldom contains pebbles larger than 1 inch in diameter, most of the gravel is fine. It has little or no detrimental effect on the soil or on farm implements.

Some areas are channery to various degrees. They contain small platy fragments of hard shale, thin sandstone, and siltstone up to 1½ inches long and about ¼ inch thick. These channery fragments are similar to those found in Apison soils and occur in areas that are more or less transitional between Apison and Hartsells soils. Both gravelly and channery areas are indicated on the soil map by gravel symbol.

In the Hartsells soils depth to bedrock ranges from 1 to 2½ feet in the very shallow to shallow areas to about 5 feet on the more deeply covered ridges or plateaus. The common range for the regular phases is 2 to 5 feet, and for the shallow phases, from 1 to 2½ feet. Depths to bedrock, however, are seldom, if ever, uniform over any large area. Areas commonly having bedrock at a depth of 26 inches or less are classified with the shallow phases, even though their average depth to bedrock is greater. Areas that are consistently deeper than 26 inches to bedrock are classified in the regular phase, even though bedrock occurs in places at less than 26 inches or appears as outcrops. Rock outcrops are indicated on the soil map by symbol.

According to local reports the unconsolidated soil material is several feet deep in some swales or at the base of some slopes where the weathered material has been deposited partly by colluvial or alluvial action. Strictly residual material probably is nowhere more than 5 feet deep.

Soils of the Hartsells series are the best soils for agriculture in the county. They occupy approximately 40 percent of the land area. They are inherently low in plant nutrients, and under common management have low productivity. The Hartsells soils are very responsive to moderately responsive to good management. They can be managed so as to produce in abundance practically all the general farm crops grown in this region. In addition, they are well suited to specialized crops.

Most of the programs of agricultural practices advocated by the county agricultural agent, other county agricultural workers, or other organizations are based on results obtained mainly on Hartsells fine sandy loam at the Sand Mountain Substation at Crossville. The practices are applied on Hartsells and associated soils and to a large extent on most well-drained agricultural soils in the limestone valleys. The recommendations, however, are undoubtedly modified when soils other than the Hartsells are to be managed.

This soil is medium to strongly acid and low in supply of organic matter and in fertility. Permeability is rapid in the plow layer and moderately rapid in the subsoil.

Hartsells fine sandy loam, undulating phase (2 to 5 percent slopes) (Hh).—This well-drained, deep soil occurs on the sandstone plateaus. It is the most typical Hartsells soil in the county. It occurs on undulating or gently sloping ridgetops and on moderately wide benches on slopes or near the base of slopes. The general slope range is 2 to 5 percent, but slopes are mostly 4 percent or lower. Some nearly level areas are included.

Runoff is slow, and internal drainage is rapid. The moisture-holding capacity is moderate. The original cover was mixed deciduous hardwoods, pines, a few broadleaf evergreens such as holly and mountain-laurel, and vines, briers, and underbrush. Areas of this extensive soil are usually from 1 to 20 acres in size, but a few exceed 50 acres. Most of the larger areas are in the northern and eastern parts of Lookout Mountain.

Profile description:

Surface soil—
- 0 to 3 inches, very dark grayish-brown to dark grayish-brown very friable fine sandy loam; contains a fairly high percentage of organic matter; very pale brown to light gray when dry.
- 3 to 11 inches, grayish-brown to brown very friable fine sandy loam; very pale brown to pale brown when dry.

Subsoil—

11 to 30 inches, yellowish-brown friable fine sandy loam to friable fine sandy clay loam; weak fine blocky structure.

Parent material—

30 to 44 inches, yellowish-brown friable fine sandy clay loam; grades into brownish-yellow loose or very friable fine sandy loam or loamy fine sand in the lower part.

44 to 48 inches, partly weathered sandstone; splotched pale brown and strong brown in places.

Parent rock—

48 inches +, sandstone.

The top dark layer of the surface soil ranges from 1 to more than 3 inches in thickness. In places the subsoil occurs at depths of 5 to 14 inches and consists of firm light sandy clay to very fine sandy clay.

Use and suitability (IIe–3).—At present this soil is principally in forest and range pasture. Every year some of it is cleared and put in crops, largely corn and cotton. The present forest has been cut over from time to time, and pines may occur in somewhat greater numbers than in the original cover because pines reseed and grow more rapidly. Some recently cleared areas on Sand and Lookout Mountains are used mainly for truck crops.

This soil has very good to excellent workability and excellent tilth. It can be worked over a wide range of moisture content. The moisture-holding capacity is moderate, and moisture-absorbing qualities are exceptionally good. The hazard of erosion is slight to moderate. The response of this soil to good management is very good, but newly cleared land takes 3 to 4 years to respond to the fullest extent. Under good management old wornout fields require about the same number of years as newly cleared land to make maximum response.

Hartsells fine sandy loam, eroded undulating phase (2 to 5 percent slopes) (Hc).—This is the most extensive and most important agricultural soil in the county. It is a well-drained deep soil of the sandstone plateaus. It occupies positions similar to those occupied by Hartsells fine sandy loam, undulating phase, but has slight differences in profile characteristics that were caused by moderate sheet erosion.

Runoff is slow, and internal drainage is rapid. The moisture-holding capacity is moderate. The original cover was chiefly deciduous hardwoods and pines. The areas of this soil are distributed over Sand, Lookout, and Fox Mountains. The largest and some of the most typical areas are in the southern and central parts of Sand Mountain.

This soil has been under cultivation for a number of years, and most of the more strongly undulating and sloping areas have lost 50 percent or more of the original surface soil through erosion. The present plow layer is grayish-brown friable fine sandy loam, but in the more deeply eroded areas it contains material brought up from the subsoil. Because the surface soil and subsoil materials are friable, the present plow layer differs very little from the original surface soil. The subsoil is yellowish-brown friable fine sandy loam to fine sandy clay loam. It is about 19 inches thick. The depth to bedrock ranges from 3 to 5 feet.

When dry, the plow layer is lighter in color and ranges from light gray to very pale brown. Although the moist subsoil is dominantly yellowish brown, it is brownish yellow or brown in places. Small, nearly level, practically uneroded areas of less than 2 percent slope are included with this soil.

Two common gradations in Hartsells fine sandy loam, eroded undulating phase, are as follows: (1) Areas that grade into Apison soil, and (2) areas that grade into Crossville soil.

The first gradation is more extensive. It is fairly common on Lookout and Sand Mountains. It resembles the Apison soil in color of the surface soil and subsoil and is more nearly like the Hartsells soil in texture and consistence. Small thin platy fragments similar to those frequently present in Apison soils occur in these areas. The color of the dry surface in a rain-packed plowed field ranges from light gray to very pale brown. Bedrock lies at depths of 1½ to 3 feet and commonly consists of varicolored, thinly bedded or stratified layers of sandstone and siltstone. It lacks, however, the shale or clay usually present in the parent material of Apison soils.

The second gradation includes areas that have browner surface soil and subsoil than the Hartsells soil and usually a somewhat less brown surface soil and subsoil than the Crossville soil. In places the soil is distinctly a transition from typical Crossville loam on one side to Hartsells fine sandy loam on the other. In some areas the transition is not so apparent, except that the parent material has certain qualities characteristic of the parent material of the Hartsells soil and other qualities characteristic of the parent material of the Crossville soil. Depth to bedrock is greater than usual for the Crossville soil and ranges from 2½ to 4 feet. An occasional boulder occurs on the surface. The texture is medium to moderately coarse. It is loam in some places but it is heavy fine sandy loam in most. The natural fertility and content of organic matter are somewhat higher than in the Hartsells soils.

Use and suitability (IIe–3).—Most of Hartsells fine sandy loam, eroded undulating phase, is used annually for row crops, chiefly corn and cotton. Small to fairly large acreages of soybeans, sorghum, potatoes, sweetpotatoes, peanuts, field peas, beans, and other minor crops are planted. The more common truck crops are watermelons, cantaloups, tomatoes, cabbage, green beans, okra, greens, cucumbers, and sweet corn. The principal hay crops are soybeans, sericea lespedeza, annual lespedeza, green oats, and alfalfa. Grazing crops are Ladino clover and fescue on selected fertile areas; sericea lespedeza alone or overseeded with rescuegrass; and mixtures of whiteclover, Dallisgrass, annual lespedeza, orchardgrass, hop clover, and bluegrass. Temporary grazing crops are oats, crimson clover, and other cover crops.

The soil has very good to excellent workability, excellent tilth, and very good moisture-absorbing qualities. In general, conservation of soil and moisture are not difficult but are very necessary if the soil is used regularly for row crops. Although the soil is naturally low in supply of plant nutrients, it responds very well to good management practices. It is suited to a very wide range of crops. It can be developed into one of the most productive soils in the county for practically all farm and truck crops commonly grown.

Management for this soil is usually better than for any other soil in the county used for major crops. Management practices are good to moderately good, and a few are excellent. Many operators, especially

landowners, follow recommended methods closely. However, a greater use of cover crops, especially winter legumes for grazing and green-manure crops, is desirable. Some areas are suitable for straight-row cultivation, but most of them require some adjustment between straight-row cultivation and contour tillage. In general, the changes in recent years indicate that more operators are applying fertilizers in quantities near or equal to those recommended. A few farmers occasionally apply more fertilizer than the amounts recommended and obtain fair returns for the additional quantity used, especially in areas on Sand and Lookout Mountains.

Hartsells fine sandy loam, rolling phase (5 to 10 percent slopes) (Hf).—This soil is similar to Hartsells fine sandy loam, undulating phase, in profile characteristics, but it has stronger slopes. It is less uniform in texture and generally somewhat shallower to bedrock. It commonly occupies fairly wide slopes, but in places it is on narrow or sharply rounded ridgetops. Although the relief is dominantly rolling, in many areas narrow ridges and small benches that have slopes of less than 5 percent are included. Some included slopes are narrow and sharply breaking and are stronger than 10 percent.

Runoff is mostly medium, but is slow on the included milder slopes and medium to rapid on the included stronger slopes. Internal drainage is rapid, and the moisture-holding capacity is moderate. The original forest cover on most areas was deciduous hardwoods and some scattered pines, but in places pines may have been dominant.

Use and suitability (IIIe–3).—Cutover forest covers most of the large acreage of this soil. Some areas are mainly in pine trees. Other areas are in cleared or partly cleared pasture, and a few have been cleared recently for crops. Additional areas are cleared annually for improved pasture or crops. Permanent pasture on gently sloping areas usually consists of Ladino clover-fescue or other grass mixtures; on stronger slopes sericea lespedeza alone or overseeded with rescuegrass is dominant.

This soil is easy to work and is moderately erodible. Its response to good management practices is very good.

Hartsells fine sandy loam, eroded rolling phase (5 to 10 percent slopes) (Hb).—This soil occurs on sandstone plateaus in positions similar to those occupied by Hartsells fine sandy loam, rolling phase, but it differs from that soil mainly in having lost a considerable amount of surface soil through erosion. In general, half to nearly all the virgin surface soil has been lost, and in places the plow layer contains friable subsoil material brought up during tillage. This soil is closely associated with Hartsells fine sandy loam, eroded undulating phase.

Runoff is medium, and internal drainage is rapid. The moisture-holding capacity is moderate. The native vegetation was principally deciduous hardwoods, but some pine was in the stand. The areas of this very extensive soil are widely distributed over Sand and Lookout Mountains. Most of them are on the central and southern parts of Sand Mountain.

The present plow layer is grayish-brown to yellowish-brown friable fine sandy loam. The subsoil is yellowish-brown friable fine sandy loam to fine sandy clay loam. It is from 16 to 19 inches thick. Beneath the subsoil is weathered or partly weathered rock, mainly sandstone. Bedrock occurs at depths of 2 to 4 feet. In many areas an almost horizontal sandstone stratum lies just beneath the surface or forms outcrops, many of which are indicated on the soil map by symbol. In some areas this stratum is fairly continuous, but in others it is intermittent. On an average, however, depth to bedrock is greater than for Hartsells fine sandy loam, eroded rolling shallow phase.

Some areas are more or less gravelly or channery, especially where they are closely associated with Apison soils. The channery fragments, mostly less than 1½ inches long and about ¼ inch thick, do not interfere with tillage to any great extent. Some included areas near Crossville are browner than usual for this soil. They are small in extent, nearly level, and very slightly eroded.

Use and suitability (IIIe–3).—Practically all areas of Hartsells fine sandy loam, eroded rolling phase, have been cleared for crops. This soil is used most commonly for corn and cotton and other row crops. Under a high level of management, some areas are nearly as productive as Hartsells fine sandy loam, undulating phase, but the cost of production is greater.

Workability is good, but, because of stronger slopes, it is not so favorable as that of Hartsells fine sandy loam, eroded undulating phase. The hazard of further erosion is moderate. Tilth is good in most places, but it is poor on small included severely eroded areas and in areas becoming severely eroded. Moisture-absorbing qualities are good to very good in the less eroded soil. In those areas where runoff is controlled and erosion is checked, the present plow layer can develop into a good surface soil. The moisture-holding capacity is moderate.

This soil responds very well to good management. Most areas can be protected against erosion by terraces and contour tillage. Close-growing crops, especially perennial crops for grazing, should be grown as frequently as possible. If row crops must be grown continuously, cover crops, especially winter legumes for green manure, should be planted as often as practical. Some areas are best suited to permanent pasture. Sericea lespedeza planted alone or overseeded with rescuegrass produces satisfactory herbage for improved pasture. This lespedeza requires a year or more to become established, but on well-fertilized and well-prepared areas grazing should be available the second year.

Hartsells fine sandy loam, undulating shallow phase (2 to 5 percent slopes) (Hk).—This soil is like Hartsells fine sandy loam, undulating phase, in parent material, most profile characteristics, and relief, but it is generally shallower to bedrock. The common range to bedrock is 1 to 2½ feet. In most places the depth to bedrock is considerably more uniform in this soil than in Hartsells fine sandy loam, rolling shallow phase. The positions occupied by this undulating shallow soil are narrow ridges and divides in the sandstone plateaus. A few areas are on fairly wide tablelands. This soil is associated chiefly with other members of the Hartsells series and with Crossville and Muskingum soils.

Runoff is slow, internal drainage is rapid, and the moisture-holding capacity is moderately low. The soil developed under a forest consisting largely of deciduous hardwoods and pines. It is probable that Virginia pine

was dominant in some of the original forest, especially areas that are closely associated with Crossville soils. This fairly extensive soil occurs in areas of 2 acres to about 25 acres. These areas are widely distributed, but most of them are in the large wooded tracts of the eastern and northern parts of Lookout Mountain and the central and north-central parts of Sand Mountain.

Profile description:

Surface soil—
  0 to 7 inches, pale-brown friable fine sandy loam; very pale brown when dry.

Subsoil—
  7 to 24 inches, brownish-yellow to yellowish-brown friable fine sandy clay to friable fine sandy clay loam; color fairly uniform in the upper part but more or less splotched with darker shades of brown in the lower part.

Parent material—
  24 to 28 inches, partly weathered sandstone.

Parent rock—
  28 inches +, sandstone.

In virgin areas the supply of organic matter in the upper 2 or 3 inches of the surface soil commonly gives it a dark-gray color. The surface soil of Hartsells fine sandy loam, undulating shallow phase, ranges from a light sandy loam to very fine sandy loam. The subsoil ranges from a fine sandy loam to a fine sandy clay but is most commonly fine sandy clay loam. In many places the soil is very closely associated with the Crossville soils, and its color is somewhat brown throughout. For the most part, the soil is free from rock fragments, although fragments occur on the surface and throughout the profile in areas closely associated with Muskingum stony fine sandy loam soils and Crossville rocky loam soils.

Use and suitability (IIIe–5).—Most of this soil is in forest, mainly deciduous hardwoods. In some areas Virginia pines are dominant, but other pines and hardwoods are scattered throughout the stand. A small percentage of the soil has been cleared or partly cleared for common range and improved pasture. Some areas are in crops.

This soil is very easy to work and has good tilth. It has good moisture-absorbing qualities, but it is less resistant to drought than Hartsells fine sandy loam, undulating phase. The hazard of erosion is slight to moderate. Conservation practices, however, are necessary if the soil is to be kept in cultivation. The response of this soil to good management is good.

Hartsells fine sandy loam, eroded undulating shallow phase (2 to 5 percent slopes) (He).—This soil is similar to Hartsells fine sandy loam, undulating shallow phase, in parent material, depth to bedrock, relief, positions occupied, and most profile characteristics. It differs mainly in having been moderately eroded in most places. It occurs on strongly undulating or gently sloping ridgetops, divides, small benches, and single slopes. Practically all ridgetops, divides, and small benches have some nearly level relief; some have stronger relief where they break toward stronger slopes or rolling areas. Soil with less than 3 percent slopes usually has lost very little of the original surface layer, but areas with 3 to 5 percent slopes commonly are eroded to various degrees and have lost 50 to 75 percent of their surface layer. Those areas that are severely sheet eroded or gullied are indicated on the soil map by symbol.

Runoff is slow; internal drainage, rapid. The moisture-supplying capacity is moderately low. This Hartsells soil is extensive and occurs in scattered areas over Lookout, Sand, and Fox Mountains. Most of the areas are less than 20 acres in size, but some range from 20 to 50 acres.

The present plow layer is pale-brown to brownish-yellow friable fine sandy loam. Where a large part of the original surface soil has been eroded, the plow layer contains subsoil material brought up by tillage. The 15-inch subsoil is brownish-yellow to yellowish-brown friable fine sandy clay to fine sandy clay loam. Beneath the subsoil is a thin layer of soft weathered sandstone. The depth to bedrock ranges from 1 to 2½ feet.

In general, the soil is free from sandstone fragments on the surface and in the profile, but where the areas are shallow or closely associated with Crossville or Muskingum soil, 4- to 10-inch sandstone fragments are fairly common. Sandstone boulders or outcrops of bedrock occur in places. In areas where the soil is closely associated with Crossville soils, the color of both the surface and subsoil is browner than is common for the soil as a whole. As mapped, this soil includes small areas of other Hartsells soils and of Crossville and Apison soils too small or too intricately associated to be outlined separately on a map of the scale used. Some areas are included that have slopes of less than 2 percent.

Use and suitability (IIIe–5).—Most of Hartsells fine sandy loam, eroded undulating shallow phase, is used annually for row crops. Corn and cotton are the principal crops.

The soil is very easy to work and has good to excellent tilth and good to very good moisture-absorbing qualities. In the included severely eroded areas and those where erosion is becoming more active, these qualities have been impaired.

This soil is not difficult to maintain by ordinary conservation practices. Shallowness to bedrock, however, makes soil and water conservation imperative if the soil is to be kept under cultivation, especially if row crops are to be grown continuously. The soil is inherently low in plant nutrients. However, it makes good response to proper management practices. Such practices include supplying required mineral nutrients and increasing organic-matter content through green-manure crops, direct applications of barnyard manure, or other means. Winter legumes can be grown successfully under proper management.

Areas that have not been farmed under good practices usually can be developed more economically if the quantity of fertilizer is gradually increased over a period of 2 or 3 years. Maximum response, however, is hard to obtain unless erosion has been controlled, especially on the stronger slopes.

Hartsells fine sandy loam, rolling shallow phase (5 to 10 percent slopes) (Hg).—This soil is similar to Hartsells fine sandy loam, undulating shallow phase, in color and texture of the surface soil and subsoil and in parent material, but it has stronger relief and is generally more shallow. Sandstone bedrock lies at depths of 1 to 2 feet, but outcrops are common in many areas. The soil occurs on narrow ridgetops and on moderately strong slopes on the sandstone plateaus. Although the slopes range from 5 to 10 percent, many small areas with slopes of less than 5 percent are included, espe-

cially small relatively level ridgetops and small benches.

Runoff is medium, and internal drainage is rapid. The soil developed under forest of deciduous hardwoods and pines. In some of the most shallow areas the trees were probably mainly Virginia pine. This extensive soil occurs mostly on Lookout and Sand Mountains, chiefly in the large wooded tracts.

Use and suitability (IIIe-5).—Most of this soil is now in forest, but the timber has been cut over from time to time. The stand of pine is probably heavier than it was in most of the original forest. Some of the soil has been cleared or partly cleared for common range pasture. A small part has been cleared for crops, and some areas have been developed for improved permanent pasture.

This soil has good workability. The erosion hazard is moderate to high. Response of the soil to good management is medium. Improved pasture is apparently a good use for this soil, especially where measures for water and erosion control are taken before erosion starts.

Hartsells fine sandy loam, eroded rolling shallow phase (5 to 10 percent slopes) (Hd).—This soil consists of eroded areas of Hartsells fine sandy loam, rolling shallow phase, that have been cultivated for a number of years, chiefly to row crops. The degree of erosion varies. In most areas erosion has been moderate and has removed 50 to 75 percent of the original surface soil. The present plow layer consists of the material remaining from the original surface soil mixed with subsoil material brought up by tillage. Some areas have been so eroded that the plow layer consists mainly of subsoil material. Some shallow gullies have formed. Severely sheet eroded and gullied areas are indicated on the soil map by symbol.

This soil commonly occupies fairly narrow strips on lower slopes between Hartsells fine sandy loam, eroded rolling phase, and Muskingum soils or Rockland, sandstone, steep, on the lower side. It also occurs on slopes bordering Hartsells fine sandy loam, eroded undulating shallow phase.

Runoff is medium; internal drainage, rapid. The water-holding capacity is moderately low. This is one of the most extensive soils in the county. It occurs in small to moderately large irregularly shaped areas that are widely distributed over Sand, Lookout, and Fox Mountains.

The present plow layer is pale-brown to brownish-yellow friable fine sandy loam. The subsoil consists of brownish-yellow to yellowish-brown friable fine sandy clay to fine sandy clay loam about 15 inches thick. Beneath this is a thin layer of soft material that weathered mainly from sandstone. The subsoil varies considerably in thickness. The depth to bedrock ranges from 1 to 2 feet.

The soil is relatively free from sandstone fragments in most areas. In some places, however, there are few to many. The size of the fragments ranges from less than 4 inches to more than 12 inches across. Outcrops of bedrock or large sandstone boulders are common.

In areas closely associated with Crossville loam, rolling phase, the color is considerably browner, the texture is somewhat finer, and the consistence is firmer than common. Both texture and consistence, however, are more nearly like those of this Hartsells soil than those of the Crossville. These brown areas, however, are transitional between this Hartsells and the Crossville soil. When the soil is wet, the color is very nearly the same as that of the Crossville soil.

Included is a soil that is transitional from this soil to Apison loam, eroded rolling phase. It is characterized by a few to very many small platy fragments that make it channery or gravelly. Except where the fragments are numerous, they do not interfere much with tillage. The very channery or gravelly spots are indicated on the soil map by symbol. The depth of this inclusion to bedrock is somewhat greater than that of Hartsells fine sandy loam, eroded rolling shallow phase, but less than that of Hartsells fine sandy loam, eroded rolling phase.

Use and suitability (IIIe-5).—This soil developed under forest, but practically all of it has been cleared for crops. A few areas have reseeded voluntarily to forest, mainly pine. This soil is used annually for general farm crops, truck crops, home gardens, and grazing. It is most commonly used for row crops, chiefly corn and cotton.

The soil is easy to work. Tilth and moisture absorption usually are good in areas farmed according to good conservation practices, but they may become very poor if erosion is not controlled. The soil is moderately to highly erodible.

The response of this soil to good management is medium. Management is fairly good on some areas and rather poor on others. Few, if any, operators use as heavy fertilizer applications as farmers living on undulating or more nearly level areas. Because of the friable subsoil material mixed in the present plow layer by tillage, this layer has regained many of the good qualities of the original surface soil. It is, however, almost impossible to work the plow layer into a satisfactory surface soil unless erosion is controlled and plant nutrients and organic matter accumulate. Some areas of this soil are so severely eroded that they can be used for pasture or forest to better advantage.

HERMITAGE SERIES

The soils of the Hermitage series have dark-brown to dark reddish-brown or reddish-brown surface soils and reddish-brown or red to dark-red subsoils. They have well-developed textural profiles. The parent material is old colluvium and local alluvium washed from higher lying soils in the limestone valleys. It consists of residuum from limestone and some material from shale and sandstone. It has been deposited chiefly on undulating and rolling foot slopes at the base of rough mountain slopes, chert ridges, or other steep slopes in the limestone valleys. This series occurs in the limestone valleys and in Deer Head Cove.

The Hermitage soils are associated closely with Allen, Talbott, Fullerton, Dewey, and Minvale soils and, in places, with Pace and Leadvale soils. The processes of parent-material accumulation and soil development, as given under the Allen series, apply to the Hermitage soils on foot slopes of Sand and Lookout Mountains. These processes are less applicable to the areas that occur on foot slopes of chert ridges. On these foot slopes the colluvium may be free or nearly free of chert, but it usually contains some chert fragments, which are seldom larger than 6 inches in diameter. The parent material on the foot slopes of

Lookout and Sand Mountains usually contains various quantities of material from sandstone. In places it consists largely of shale. Some of the sandstone fragments present in the parent material are more than 12 inches in diameter.

The Hermitage soils are medium to strongly acid and medium in supply of organic matter. Fertility ranges from low to high. Permeability is commonly moderate in the surface layer and moderately slow in the subsoil. The moisture-holding capacity ranges from moderate to low. The soils of this series are high to low in productivity and have a wide to narrow range of use suitability.

Hermitage silty clay loam, eroded undulating phase (2 to 5 percent slopes) (Hm).—This well drained moderately fine textured soil occupies undulating and gently sloping positions on foot slopes in the limestone valleys.

Runoff is slow to medium, and internal drainage is medium. The moisture-holding capacity is moderate. The soil developed under forest vegetation, largely deciduous hardwoods and pines. Scattered redcedars grew in places. Although this soil covers a small total area, it is the most important Hermitage soil in the county for agricultural use. The individual areas are small, but most of them are located so that they can be worked with large adjoining areas of other soils that have a similar use suitability.

Profile description:

Surface soil—
- 0 to 8 inches, dark-brown to dark reddish-brown friable heavy silt loam to silty clay loam; brown when dry; moderate fine granular structure; some chert fragments on and in the soil.

Subsoil—
- 8 to 26 inches, reddish-brown friable to firm heavy silty clay loam to silty clay, showing faint streaks and splotches of dark-brown organic stains; yellowish red when dry; moderate fine subangular to angular blocky structure to moderate medium subangular to angular blocky; color of coatings on structure units is slightly darker than the color inside the units.
- 26 to 42 inches, red to dark-red friable silty clay; sticky and plastic when wet, hard when dry; moderate medium angular and subangular blocky structure.

Underlying material—
- 42 inches +, chiefly old colluvium composed principally of silt and clay.

Depth to bedrock ranges from 4 to 10 feet. The texture of the surface soil ranges from a moderately heavy loam or silt loam to silty clay loam. The texture depends largely on the amount of the original friable surface soil that has been removed by erosion and on the character of surface soil material that is left. The chert or sandstone fragments that occur on and in the soil range from very few to many.

Use and suitability (IIe–1).—This soil is used almost entirely for row crops, principally corn and cotton. It is also suited to practically all the farm crops locally grown. Very little of the soil is in pasture, although desirable pasture grasses can be grown.

Under ordinary management, this soil generally outproduces the better Hartsells soils in both cotton and corn. It is somewhat less responsive, however, to heavy applications of fertilizer. When cleared areas are first planted to crops, yields are fairly good without fertilizers, but as cropping continues yields become smaller. Under good management, however, the soil can be maintained at a reasonably high level of productivity.

This soil has good to very good moisture-absorbing qualities. It is moderately erodible. Except in the more severely eroded areas, this soil is very easy to work. Tilth is excellent where the present plow layer consists mostly of the original friable surface soil. It is poor where the plow layer is mainly subsoil material.

Any further loss of the friable surface soil will impair moisture absorption, tilth, and ease of workability. Measures therefore should be taken to conserve the soil before erosion becomes serious.

Most of the eroded areas can be reclaimed successfully by use of well-constructed terraces and by smoothing the rough gullied spots. It will take time to restore the soil to its original good qualities. The response of this soil to good management is medium.

Areas of this soil that are only slightly eroded, or that have been farmed under good conservation practices long enough to develop a good surface soil, can be classified with good agricultural soils. Such soils are Huntington silt loam, Etowah silt loam, eroded undulating phase, and Hartsells fine sandy loam, undulating phase.

Hermitage silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Hl).—This soil is similar to Hermitage silty clay loam, eroded undulating phase, in most profile characteristics and in source of parent material. It occurs on stronger relief, however. On the upper side, the slopes generally are continuations of stronger slopes; on the lower side, they grade into milder slopes. Runoff and internal drainage are medium. The total extent is relatively small, and most areas are closely associated with Hermitage silty clay loam, eroded undulating phase.

Use and suitability (IIIe–1).—All of Hermitage silty clay loam, eroded rolling phase, has been cleared and used for crops. Corn and cotton are the chief crops.

This soil has good workability. The hazard of further erosion is moderate. In general, erosion has been more active than on Hermitage silty clay loam, eroded undulating phase, and has caused correspondingly greater impairment of workability, tilth, and moisture-absorbing qualities. The problems of soil and moisture conservation have increased, and areas not adequately protected by good conservation practices now approach marginal land in use suitability.

The response of this soil to good management is medium. Good management includes the planting of close-growing crops as often as possible—especially pasture grasses. Under this management many reclaimed areas are desirable for crops. Most areas can be maintained at a medium to high level of productivity.

Hermitage silty clay loam, severely eroded rolling phase (5 to 12 percent slopes) (Hn).—This soil differs from Hermitage silty clay loam, eroded undulating phase, mainly in having stronger slopes, a greater loss of surface soil through erosion, and generally a heavier and finer textured plow layer. Practically all, or all, of the surface soil and, in places, part of its subsoil have been eroded. In many areas rough gullied spots have developed, as well as an occasional deep gully with steep walls.

Runoff is medium to rapid, and internal drainage is medium. The moisture-holding capacity is moderate to low.

The present plow layer consists almost entirely of subsoil material. It is reddish-brown, friable to firm,

heavy silty clay loam to silty clay. In the upper part the subsoil is similar to the plow layer in color, texture, and consistence, but it contains streaks and splotches of dark-brown organic stains. In the lower part it consists of red to dark-red friable silty clay. The subsoil has a total thickness of about 16 inches. It grades into old colluvial or local alluvial material composed largely of silt and clay that originated mainly from high-grade limestone. The depth of this soil to bedrock ranges from 2 to 7 feet.

Use and suitability (IIIe-1).—Most of this inextensive soil is idle or in range pasture. A small part is planted annually to general farm crops, mainly corn, cotton, or other row crops.

Erosion has impaired workability and moisture absorption. The soil is difficult to work, and very little absorption takes place during heavy showers. The hazard of further erosion is high.

The response of this severely eroded soil to good management is medium. With the better conservation practices that are being used, more of the soil will be reclaimed and developed into fairly productive cropland. Where the surface materials have been stabilized by proper conservation methods, the deeper areas of the soil tend to develop a new surface soil.

Some farmers have become interested in developing this soil for additional grazing. Several areas were adequately terraced to control surface water and erosion and then seeded to pasture grasses. Sericea lespedeza is a desirable pasture plant if seeded early in spring while moisture is still plentiful and overseeded with rescuegrass in fall at about the first killing frost. Usually some hay or grazing is produced the second year, and with proper care the grazing should last for a number of years. Under good management, row crops, such as corn or cotton, can be rotated with pasture every 1 to 3 years, but for best results pasture should be the dominant crop in the rotation.

HUNTINGTON SERIES

The soils of the Huntington series are well drained and occur on first bottoms in limestone valleys. They are forming in recent general alluvium washed from uplands underlain mainly by high-grade limestone. This alluvium, however, varies from place to place in the narrow valleys where it occurs, because the rocks that contributed to its formation are of different types. Although most of the alluvium was derived from high-grade limestone, some came from sandstone, cherty limestone, dolomitic limestone, chert, gray shale, and red shale.

The silt loam of this series consists mostly of recently accumulated general alluvium that resembles the alluvium of Abernathy silt loam. The fine sandy loam of the series is moderately coarse textured and very friable; it contains an appreciable quantity of sand. These two soils usually have very little or no textural profile development. A few areas along the larger streams, however, have developed on older alluvium and have fairly well developed textural profiles.

The soils of this series are slightly acid to medium acid and have a moderate supply of organic matter. They are very high to high in productivity and have a wide range of suitability.

Huntington silt loam (0 to 2 percent slopes) (Hp).—This friable medium-textured soil occurs near streams and is subject to periodic overflow. Although the slopes range from 0 to 2 percent, they are usually somewhat stronger along the main channels, lateral drains, and swales where the surface dips rather sharply toward a lower level. This soil is associated with Dewey and Talbott soils of the uplands, the Hermitage and Abernathy soils of the colluvial lands, the Etowah soil of the terrace lands, and the Lindside and Melvin soils and Huntington fine sandy loam of the bottom lands. In places it is so closely associated with Abernathy silt loam and Huntington fine sandy loam that one soil grades into the other.

In a few areas along the larger streams the general alluvium is comparatively old. On this alluvium the native forest cover was mainly deciduous hardwoods, but scattered pine, redcedar, and holly were included. Vines and briers were common undergrowth. Most of the recent alluvium has accumulated since the soil was cleared for crops and pasture.

In most areas of Huntington silt loam, runoff is very slow to slow. Internal drainage generally is medium. This soil is moderately permeable and has a very high moisture-holding capacity. It occurs mostly in Big Wills Valley, but some areas are in the other limestone valleys and in Deer Head Cove.

Profile description:

Surface Soil—
0 to 32 inches, dark-brown to dark yellowish-brown friable silt loam; very pale brown when dry; weak fine crumb structure.

Subsurface—
32 to 42 inches, dark yellowish-brown very friable silt loam containing some very fine sand; pale brown when dry; weak medium blocky structure.

Underlying material—
42 inches +, very friable alluvium consisting chiefly of sand, silt, and clay; some gray mottles.

The depth of this soil to bedrock is 5 feet or more. The surface soil varies considerably in thickness. In places it consists of stratified alluvial materials. The color of the surface soil ranges from a light brownish gray through brown to light reddish brown, but in most areas it is dark brown to dark yellowish brown. The color of the subsurface layer usually is dark yellowish brown. In some places it is yellowish brown, and in others it has a reddish cast. The texture of the surface soil ranges from heavy loam to silty clay loam, and that of the subsurface layer ranges from heavy loam to silty clay.

Use and suitability (IIw-2).—This is one of the best soils in the county for corn. Some areas have been used almost exclusively for this crop. Cotton is sometimes grown on other areas. Along creeks and other fairly large drainageways, much of the soil is best used for permanent pasture. Some of these areas are now in pasture.

This soil is high in fertility. It has excellent workability over a wide range in moisture content. Some of the nearly level or level areas are a little slow in drying after a heavy shower or long wet period. The soil has excellent tilth and moisture absorption. Problems of soil and moisture conservation usually are not difficult. Erosion is somewhat active on some of the sharply breaking borders, although the eroded spots are small. Some of the breaks are along the field boundaries. Because this soil is naturally favorable for agriculture, it makes little response to good management.

Huntington fine sandy loam (0 to 2 percent slopes) (Ho).—This very friable to friable moderately coarse textured soil is closely associated with Huntington silt loam. The two soils are similar in parent material, drainage, and relief, but Huntington fine sandy loam is somewhat grayer in color and coarser in texture. It is commonly associated with Tellico soils of the uplands and with Allen, Muse, and Minvale soils of the colluvial lands. The relief is level or nearly level. Short sharp breaks leading to channels or lower lying areas occur in places. The breaks have stronger slopes, but the total drop seldom exceeds 4 to 6 feet and usually is less.

Runoff is very slow, and internal drainage is medium to rapid. Most areas are subject to overflow during winter or during heavy rains in other seasons. Usually little or no damage results from winter floods, but floods occurring late in summer or in fall are more destructive, especially to corn and hay crops. The natural vegetation was mainly deciduous hardwoods, briers, and vines. There were some scattered pines and redcedars.

Profile description:

Surface soil—
- 0 to 7 inches, dark grayish-brown to dark-brown very friable fine sandy loam to very fine sandy loam; light yellowish brown to pale brown when dry; weak fine crumb structure.

Subsurface—
- 7 to 15 inches, brown or reddish-brown friable very fine sandy loam or light very fine sandy clay; light yellowish brown to light brown when dry; slightly sticky when wet; weak medium granular structure.
- 15 to 36 inches, brown to reddish-brown friable very fine sandy clay loam or heavy very fine sandy loam; color rather uniform but becomes somewhat gray with increasing depth; dry material is pale brown to brown.

Underlying material—
- 36 inches +, very friable alluvial material showing some gray mottles.

The soil varies mainly in the texture and the depth of the recently accumulated alluvium. In many areas, particularly in Big Wills Valley, the entire soil profile consists of recently accumulated alluvium. In these areas, the color of the subsurface layer is more uniform than in areas of this soil formed on the old alluvium. In areas where the upper part of Huntington fine sandy loam is recent alluvium and the lower part is old alluvium, the old soil generally is finer textured and less well drained.

The texture and color of the subsurface layer are affected by the depth of the recently accumulated alluvium. In areas of this soil formed on old alluvium, the texture ranges from silty clay to silty clay loam, and the color is more or less splotched with gray and pale brown. The underlying material ranges in texture from light fine sandy loam to silt loam. Most areas of Huntington fine sandy loam that are gravelly or sandy near the points where the floodwater leaves the main channels become finer in texture over wider or more nearly level areas where the water slows down. In some areas in Sand Valley, particularly in the narrow valleys leading from Sand Valley toward Big Wills Creek, the fine sandy loam is dominant. In the wider valleys very fine sandy loam predominates.

This soil, as mapped, includes small areas of Bruno loamy fine sand, Bruno sand, and gravelly outwash. All of these areas total about 40 acres. The surface soil of Bruno loamy fine sand is light-brown to yellowish-brown very friable loamy fine sand about 12 inches thick. The subsurface layer is brownish-yellow to yellowish-brown very friable loamy fine sand, 24 inches or more thick. In most places the subsurface layer is lighter colored and more sandy in the lower part. The depth to bedrock for this included soil is 5 to 16 feet.

In most places the included Bruno sand consists of light-brown to yellowish-brown loose sand from the surface downward for many feet. Bedrock underlies the soil at 5 to 16 feet.

In most places the gravelly outwash is a mixture of waterworn gravel and angular chert gravel. In some places it consists largely of waterworn gravel. In others it is mainly fine angular chert fragments. The largest areas of Bruno loamy fine sand and gravelly outwash are along Big Wills Creek just south of State Highway No. 35 and extend northward for several miles.

Use and suitability (IIw–2).—Practically all the fairly large acreage of Huntington fine sandy loam has been cleared and used for crops and pasture. About half is used for improved pasture. In the past, most of the soil was used for corn and hay.

This soil has excellent workability and has very good tilth and moisture-absorbing qualities. It is medium to high in fertility, and permeability is moderately rapid. The moisture-holding capacity is moderate to high in most areas. It is moderately low in the more sandy areas, however, especially in the included areas of Bruno loamy fine sand and Bruno sand, and in some of the fine sandy loam areas along the narrow bottoms leading from Sand Valley to Big Wills Creek. The response of this soil to good management is very good.

In the past, crops were planted on this soil without the addition of mineral fertilizers, but in more recent years the use of such fertilizers has become common. The quantity of fertilizer applied, however, is seldom as large as that used on the higher lying soils of the limestone valleys.

JEFFERSON SERIES

The Jefferson series consists of light-colored soils that formed over old colluvium and local alluvium. This material tumbled or washed from the bluffs of Sand and Lookout Mountains. The parent material originated mostly from sandstone, but to some extent from limestone and shale. It is generally similar to the parent material of the Allen soils, but in places it is like that of the Leadvale soils, especially where the content of shale materials is relatively high.

The Jefferson soils are closely associated with the Allen soils and occupy somewhat similar positions. They occur only in the limestone valleys and occupy foot slopes near the bases of Lookout and Sand Mountains. Under their original cover, the Jefferson and Allen soils differ mainly in the color of their subsoils. The Jefferson subsoils are dominantly brownish yellow or yellowish brown, and those of the Allen soils are dominantly red or reddish brown. In cultivated areas the eroded surface layers of these two soils generally differ in color. Most of the Allen soils have a reddish color because subsoil material has been mixed with the surface soil during tillage.

The Jefferson soils are medium to strongly acid and low in supply of organic matter and fertility. Permea-

bility in the surface layer is moderately rapid, and in the subsoil, moderate. The moisture-holding capacity is moderate. The productivity of the soils of the Jefferson series is low; their range in use suitability is wide.

Jefferson loam, eroded undulating phase (2 to 5 percent slopes) (Jb).—This soil occupies small benches, gentle slopes, gently sloping to nearly level areas around drainage heads, and colluvial fans. Some of the areas near drainage heads and on colluvial fans have slopes that are less than 2 percent.

Runoff is slow. Internal drainage is medium, but it may be somewhat slow in nearly level places that receive seepage from higher ground during wet seasons. The soil has moderate moisture-holding capacity. The more eroded areas, however, retain less moisture. The soil originally supported a luxuriant forest consisting mainly of deciduous hardwoods and scattered pines. Some holly and redcedar grew in places. The areas of this inextensive soil are small and are mostly in Sand Valley. A few are in Railroad and Little Wills Valleys, and one is in Deer Head Cove.

Profile description:

Surface soil—
- 0 to 8 inches, yellowish-brown very friable loam to fine sandy loam; pale brown when dry.

Subsoil—
- 8 to 32 inches, brownish-yellow friable fine sandy clay; yellow when dry, sticky when wet; weak fine subangular to medium subangular blocky structure.

Underlying material—
- 32 to 45 inches, brownish-yellow friable fine sandy clay faintly splotched with shades of brown; slightly hard or compact when dry, sticky and plastic when wet.

The underlying material varies in texture according to the amount of sand present. Most areas have a fairly heavy sandy clay to silty clay or shaly silty clay subsoil. Depth to bedrock ranges from 2½ to 8 feet. In places the soil occurs on relatively young colluvial fans and has a relatively friable surface soil and subsoil. In other places, especially in association with Colbert soils, the subsoil is comparatively firm and tight and is sticky when wet. A few areas closely associated with Leadvale soils have a firm and tight, somewhat shaly subsoil.

Use and suitability (IIe–3).—Nearly all of this soil has been under cultivation for a long time. Most of it is now used annually for general farm crops, mainly corn and cotton. Some areas are in improved pasture, and a few are idle or in common pasture.

The soil is very easy to work. It is slightly to moderately erodible. Erosion, however, has impaired moisture-absorbing qualities and has increased the problem of soil and moisture conservation. Most areas have lost 50 to 75 percent of their original surface soil. The subsoil is fairly heavy, and further loss of friable surface soil would therefore be increasingly detrimental. Under management that includes good conservation practices, however, the less eroded areas can be kept productive, and most of the more eroded areas can be reclaimed. The included areas that have a firm tight subsoil require a longer time to reclaim than those that have a friable subsoil.

The soil is fairly well suited to corn and cotton, as well as soybeans, annual lespedeza, sericea lespedeza, sorghum, potatoes, and other minor crops. It has lower inherent fertility than the finer textured Hermitage and Dewey soils, but it responds very well to good management. It particularly needs green-manure crops to supply organic matter.

Jefferson loam, eroded rolling phase (5 to 12 percent slopes) (Ja).—This soil differs from Jefferson loam, eroded undulating phase, in having stronger slopes and in being somewhat more eroded. Although the relief ranges from 5 to 12 percent, very few slopes exceed 9 percent. This soil occurs near the base of areas having somewhat longer and stronger slopes and is subject to runoff from higher lying soils. Fairly deep gullies extend across or nearly across some areas.

Runoff is medium, and the hazard of further erosion is moderate. Internal drainage is medium. Most of this inextensive soil is in Sand Valley. It is closely associated with Allen soils and with Jefferson loam, eroded undulating phase.

The 7-inch surface layer is pale-brown to brownish-yellow very friable loam to fine sandy loam. The subsoil, a brownish-yellow to yellowish-brown friable fine sandy clay, is about 23 inches thick. The underlying material is brownish-yellow friable fine sandy clay that shows faint splotches of shades of brown. The depth to bedrock is from 2 to 7 feet. In places sandstone fragments are fairly common on the surface and throughout the profile. A few moderately large sandstone boulders outcrop in places.

Use and suitability (IIIe–3).—Most of this soil has been cleared and used for row crops, principally corn and cotton. The soil has good workability; productivity is low.

Close-growing crops and improved pasture are among the best uses for this soil. Pastures of sericea lespedeza are also suitable. The pasture can be rotated with row crops for 2 or 3 years if the soil is reasonably fertile and the slope is not too strong. The soil responds very well to good management.

JOHNSBURG SERIES

The soil of the Johnsburg series has developed from parent material derived largely from weathered products of sandstone and conglomerate. This material has been modified more or less by weathered products of shale. The positions occupied are very gentle slopes and low saddles or divides on uplands and areas around drainage heads in the nearly level uplands. Under the original cover or grass, the upper part of the surface soil usually has enough organic matter to give it a fairly dark color; but in the plowed field, the surface soil generally is very pale brown or light gray. The relief ranges from level or nearly level to very gently sloping or very gently undulating.

The Johnsburg soil is medium to strongly acid. It is low in fertility and supply of organic matter. Permeability is rapid in the surface layer and moderately rapid in the subsoil. The moisture-holding capacity is moderate to high. The soil is low in productivity. It has a medium range of suitability.

Johnsburg loam (0 to 3 percent slopes) (Jc).—This poorly drained soil occurs on the sandstone plateaus. It is not so well drained as the Hartsells and Apison soils of these plateaus, but is better drained than the Lickdale soil. Both runoff and internal drainage are slow. The soil usually remains saturated during wet seasons.

The original cover was mainly deciduous hardwoods and scattered pines. The hardwoods now commonly on this soil are post, water, and laurel oaks, hickory, gum, maple, elm, and poplar. This soil is somewhat

small in extent and is closely associated with Hartsells, Apison, and Muskingum soils and, in places, with Lickdale and Crossville soils.

Profile description:

Surface soil—
 0 to 9 inches, very pale-brown to light-gray friable loam to silt loam.

Subsoil—
 9 to 24 inches, pale-yellow to light yellowish-brown friable loam to very fine sandy clay loam; stained with strong-brown streaks caused by breaking down of dark-brown to very dark-brown, small, round concretions.
 24 to 36 inches, faintly splotched to distinctly mottled gray, yellow, and brown friable silty clay or heavy silty clay loam; sticky and plastic when wet.

Parent material—
 36 inches +, residual products of weathered acid sandstone, conglomerate, and shale.

In virgin areas the surface soil to a depth of about 3 inches is dark grayish brown and contains a good supply of organic matter. The depth to bedrock ranges from 2½ to 5 feet. In some places a compact cemented layer occurs at 24 to 30 inches. This layer is not continuous over very large areas.

Use and suitability (IIIw–1).—Johnsburg loam is used mainly for corn, soybeans, sorghum, and fall truck crops. Some of the better drained or higher lying areas are used for cotton; the more poorly drained areas are seldom used for this crop. The soil is very well suited to Ladino clover and fescue, and more areas could be used for improved pasture if necessary.

Artificial drains are needed on most of this soil if it is to be used satisfactorily for crops. The soil responds very well to good management practices.

LEADVALE SERIES

The soils of the Leadvale series occur in the limestone valleys on undulating and rolling colluvial slopes, fans, and benches near the bases of stronger slopes. They have formed from accumulations of colluvium and local alluvium that washed from soils derived largely from residual products of shale, chiefly gray shale. In places these accumulations are modified somewhat by materials from red shale, limestone, cherty limestone, chert, and sandstone.

Leadvale soils are associated closely with Litz, Muse, Jefferson, and Tellico soils and in places with Minvale and Allen soils. Most areas are in Sand and Dugout Valleys, but some are in Little Wills and Railroad Valleys, and a few are in Big Wills Valley. The soils developed under a forest consisting chiefly of mixed deciduous hardwoods, pines, and redcedars.

The Leadvale soils are medium to strongly acid and low in fertility and in supply of organic matter. The productivity of these soils is low, and their range of suitability is medium.

Leadvale silt loam, eroded undulating phase (2 to 5 percent slopes) (Lb).—This soil is somewhat poorly drained to moderately well drained. Although slopes range from 2 to 5 percent, some nearly level fans are included that have slopes of less than 2 percent. In most areas the colluvium is old, but in some it is recent, especially the surface material that accumulated on many nearly level fans after erosion became active.

Runoff is slow to medium, and the hazard of further erosion is moderate. Internal drainage is slow. Permeability is moderate in the surface soil and is slow in the subsoil. The moisture-holding capacity is moderate, but the soil tends to be somewhat droughty during the growing season. The small areas of this inextensive soil are distributed over limestone valleys, mainly Dugout and Sand Valleys.

Profile description:

Surface soil—
 0 to 6 inches, brownish-yellow friable heavy silt loam to silty clay loam; very pale brown or pale yellow when dry; plastic when wet.

Subsoil—
 6 to 16 inches, yellow to brownish-yellow friable silty clay; plastic when wet; moderate fine angular to medium angular blocky structure.

Underlying material—
 16 to 36 inches, mottled brownish-yellow, red, and gray silty clay to shaly silty clay or shaly clay; plastic when wet; moderate fine to medium angular blocky structure.

The underlying material varies greatly from place to place, because of the relatively thin formations and the fairly steep dip, especially in Dugout Valley, of the exposed formations. The thickness of the colluvium and alluvium and the depth to bedrock also varies. The depth to bedrock—usually shale, limestone, or cherty limestone—varies from 2½ to 8 feet.

Use and suitability (IIIw–1).—Practically all areas of Leadvale silt loam, eroded undulating phase, have been cleared and cultivated. They have been used largely for row crops, chiefly cotton and corn, but many areas are now being used for improved pasture along with adjoining rolling and hilly areas of other soils. Winter legumes are suited if runoff is adequately controlled.

The soil is very easy to work. It responds very well to good management. Management practices have generally been adequate to protect the soil against washing. Where runoff and erosion are controlled and other management is good, the soil can be kept at a fairly high level of productivity.

Leadvale silt loam, eroded rolling phase (5 to 12 percent slopes) (La).—This soil has stronger slopes and has undergone more erosion than Leadvale silt loam, eroded undulating phase. Most areas have lost from 50 percent to more than 75 percent of the original surface soil, and in these the plow layer contains some subsoil material brought up by tillage. Some areas have shallow gullies, whereas others are scarred by fairly deep gullies. Severely eroded and gullied areas are indicated on the soil map by symbols. The general slope range is 5 to 12 percent, but most of the slopes are less than 9 percent.

Runoff is medium; internal drainage, slow. Permeability is slow in the surface soil and moderately slow in the subsoil. The moisture-holding capacity is moderately low. Except where runoff is controlled, the amount of water absorbed and retained by the soil during the growing season is inadequate for growing crops.

Use and suitability (IIIw–1).—This inextensive soil has been improved for crops, but because of erosion, much of it is idle or used for common range pasture. A small part is used annually for cotton, corn, soybeans, or other locally grown farm crops. The yields are generally small because little of this soil has been properly terraced or kept sufficiently fertile to produce row crops continuously.

The soil has good workability. The response to good management practices is medium to very good. Improved pasture is a good use for this soil. If the location is not suited to pasture, pine trees can be grown.

LICKDALE SERIES

The soil of the Lickdale series is closely associated with Hartsells, Muskingum, Apison, and Johnsburg soils on the sandstone plateaus. It is a wet soil that occurs on upland flats, in depressions, and on very gentle slopes around drainage heads. The parent material consists of residuum from acid sandstone, conglomerate, and shale. In places alluvial and colluvial materials from the Hartsells, Muskingum, and Apison soils, or from weathered rock, have been added to this soil. The Lickdale soil is medium to strongly acid. It has a moderate supply of organic matter but it is low in fertility. The surface soil is rapidly permeable, and the subsoil is slowly permeable. The soil is low in productivity and it has a narrow range of suitability.

Lickdale loam (0 to 2 percent slopes) (Lc).—This dark-colored soil is poorly drained to very poorly drained. The relief is commonly level to nearly level but it is very gently sloping in depressions. The depression rims in places have short more pronounced slopes.

Runoff is slow and internal drainage is very slow. Some areas occur adjacent to Johnsburg loam, but they are lower lying and more poorly drained than normal for Lickdale loam. Seepage from higher lying areas is fairly common to all the soil.

The native cover is principally water-tolerant trees such as tupelo, sweetgum, water oak, elm, ash, hickory, persimmon, and pine. The small vegetation consists of briers, vines, and coarse grasses. The areas of this inextensive soil are mostly on Sand Mountain, but some are on Lookout Mountain.

Profile description:

Surface soil—
- 0 to 8 inches, very dark-brown, very friable, heavy loam to silt loam; sticky when wet; weak fine granular structure.

Subsoil—
- 8 to 12 inches, dark-gray, friable, heavy very fine sandy clay to silty clay, faintly mottled with shades of yellow and brown; gray and hard when dry, sticky when wet; weak medium angular blocky structure.
- 12 to 20 inches, mottled light-gray, yellowish-brown, and olive-yellow, friable silty clay; light brownish gray when dry, sticky when wet; weak fine angular to medium angular blocky structure; water table at 20 inches.

Underlying material
- 20 to 48 inches +, unconsolidated soil material weathered from acid sandstone, conglomerate, and shale.

The surface soil ranges in texture from fine sandy loam to silt loam. Usually the subsoil is heavy fine sandy clay or very fine sandy clay, but in some areas, especially those closely associated with Apison soils, it is silty clay or clay. In virgin areas or where the soil has been in grass for a number of years, the upper layer commonly is very dark. In drained and cultivated areas, the dry surface soil generally is light gray or very pale brown.

Use and suitability (IVw–1).—This soil is largely in pasture and forest. Under natural conditions it is too poorly drained for row crops or good pasture, but when drained, it is fairly easy to work and has excellent tilth and moisture-absorbing qualities. The erosion hazard is slight. Some areas, however, require protection from loose sandy deposits washed from higher lying soils.

This soil responds very well to good management; it is excellent for improved pasture. Pasture can be improved by draining away the excess surface water. Ladino clover and fescue make a good mixture for improved pasture, but other grass mixtures have proved successful. The best use for this soil is improved pasture. If the soil is not needed for that purpose, it can be drained sufficiently for sorghum, corn, and fall potatoes or other late truck crops.

LINDSIDE SERIES

The soil of the Lindside series is distinguished by its dark-brown surface soil and mottled subsurface layer. It is forming in recently accumulated general alluvium that was washed from uplands underlain mainly by high-grade limestone. The alluvium is modified to some extent by materials from sandstone, cherty limestone, dolomitic limestone, chert, gray shale, and red shale. The material is similar to that of Huntington and Melvin soils. The Lindside soil is not so well drained as the Huntington but is better drained than the Melvin.

The Lindside soil is slightly acid to neutral. It has a moderate supply of organic matter and is high in fertility. The surface soil has moderate permeability, and the subsurface layer has moderately slow permeability. The moisture-holding capacity is high. The productivity of the soil is very high, and its range of suitability is medium.

Lindside silt loam (0 to 2 percent slopes) (Ld).—This somewhat poorly drained soil occurs on the flood plains of streams in the limestone valleys. It is closely associated with the Huntington and Melvin soils and in places with the Abernathy and Ooltewah soils. The relief is generally level or nearly level, but undulations and short sharp slopes occur in places, especially along the present channels and old channels, and in swales. In most places the color of the soil is apparently the result of soil development, but in some the color is derived from the upland soils from which the parent material washed.

Runoff is very slow and internal drainage is slow. The relief commonly is broken by gentle undulations that tend to form natural outlets for any excess surface water. The water table is high during winter and other wet seasons, but ordinarily drainage is adequate for corn and hay during the growing season. The soil is subject to occasional overflows from adjacent streams, particularly in winter and early in spring. High water, however, may occur during the growing season. The native cover is similar to that of the other flood plains in the limestone valleys. It is mostly deciduous hardwoods, mixed with pines and redcedars. Briers and vines are common undergrowth.

Profile description:

Surface soil—
- 0 to 16 inches, dark-brown friable silt loam; very pale brown when dry; upper 2 to 3 inches contains many grass roots; weak medium platy structure.

Subsurface -
: 16 to 36 inches, mottled dark-brown, light brownish-gray, and yellow friable silt loam to silty clay loam; very pale brown, with many faint, fine, light yellowish-brown mottles, when dry; sticky when wet.

Underlying material—
: 36 inches +, friable alluvium consisting of sand, silt, and clay.

The depth of the soil to bedrock is 5 feet or more. The layers of the profile differ somewhat in thickness. The alluvial parent materials of this soil were derived from various geologic formations and from the soils developed over them. As a result, most of the material varies considerably in color and texture. In places the materials are largely from weathered limestone, cherty limestone, chert, gray shale, red shale, or sandstone. More commonly the materials are composed of mixtures from two or more of these sources.

As mapped, this soil includes several areas of Hamblen fine sandy loam and very fine sandy loam. The Hamblen soils are similar to the Lindside in color, drainage, and positions occupied, but their parent alluvium contains more fine and very fine sand derived from sandstone. They also have the same use suitability. In places the Lindside and Hamblen soils are so intricately associated that their separation on the soil map is not practical.

Use and suitability (IIw–1).—The fairly extensive acreage of Lindside silt loam is used mainly for crops and pasture; it is well suited to crops and to improved pasture. Corn, soybeans, annual lespedeza, sorghum, and other crops are grown. Cotton is not a common crop, but it has been produced on well-drained areas.

The soil has good workability and moisture-supplying qualities and excellent tilth. The erosion hazard is slight. Response to good management practices is medium.

If this soil is to be used for cultivated crops, it needs special protection from floods. Areas subject to very rapid flow of floodwaters can be protected by narrow belts of timber or brush planted between cleared areas. These belts reduce the speed of the current and minimize scouring or stream erosion.

LINKER SERIES

The Linker series consists of light-colored friable loamy soils on the sandstone plateaus. These soils were derived from materials weathered from sandstone, conglomerate, and shale. They are closely associated with Hartsells and Apison soils. They differ from the Hartsells mainly in color of the subsoil. The Linker soils have strong-brown to yellowish-red subsoils, whereas the Hartsells usually have yellowish-brown subsoils. The virgin Linker and Hartsells soils have surface soils that are almost alike; but after tillage, even if only slightly eroded, the Linker surface soil is usually reddish in spots. The Apison soils contain more material derived from shale than the Linker soils.

The Linker soils occur on upland positions similar to those occupied by Hartsells soils. Most areas of Linker soils, however, are near the bluffs, locally known as the brows, of Lookout, Sand, and Fox Mountains. In a few places they are near other sharp breaks or gorges where drainage and aeration have been favorable for a very long time. Most of the acreage of the Linker soils is on Lookout Mountain along the bluffs from Collbran southwestward to the De Kalb-Etowah County boundary south of Collinsville, where two nearly parallel bluffs occur in places. The rock formation of the outer bluff is tilted upward toward the northwest. The surface of the southeasterly slopes lies nearly parallel to the dip of the bedrock. The surface of the dipping bedrock is hard and relatively smooth and provides excellent internal drainage. The depth to bedrock is less on these slopes than it commonly is in other Linker soil areas. Most of the areas having slopes of 10 to 15 percent are on the outer bluffs, where the slope of the surface nearly parallels that of the bedrock. In other areas the upper slope is generally about 10 percent.

Soils of the Linker series are medium to strongly acid and have a low supply of organic matter and low fertility. Permeability is rapid in the surface soil and moderately rapid in the subsoil. These soils are low to medium in productivity and have a wide to very wide range of suitability.

Linker fine sandy loam, eroded undulating phase (2 to 5 percent slopes) (Lf).—This soil occupies gently rounded fairly narrow ridgetops. It occasionally occurs in other places, especially in long prongs between deep gorgelike drains. The relief on some of the ridgetops is nearly level.

Runoff is slow, and internal drainage is medium to rapid. The moisture-holding capacity is low. This soil developed under mixed forest, mainly deciduous hardwoods and pine. After it was cleared and tilled, erosion removed 50 to 75 percent, or more, of the original surface soil in spots. The present surface layer consists mostly of material remaining from the original surface soil, but in the more eroded areas it is mixed with subsoil material brought up by the plow. Areas of this soil are prevailingly small, and many are nearly surrounded by Linker fine sandy loam, eroded rolling phase. A few areas occupy relatively narrow ridgetops within larger areas of Hartsells soils.

Profile description:

Surface soil—
: 0 to 6 inches, yellowish-brown friable fine sandy loam; light yellowish brown to reddish yellow when dry.

Subsoil—
: 6 to 26 inches, strong-brown to yellowish-red friable fine sandy clay loam; somewhat redder in color and finer in texture with increasing depth; reddish yellow when dry; moderate medium subangular to fine subangular blocky structure.

Parent material—
: 26 to 42 inches, red friable fine sandy clay, splotched or mottled with shades of yellowish brown, reddish brown, and light brownish gray; light red when dry.
: 42 inches +, soft decomposed rock, mainly sandstone.

The depth of the soil to bedrock ranges from 2 to 4 feet. The surface soil in cultivated areas ranges from 4 to 8 inches in thickness, depending mostly on the quantity of soil material removed by erosion. In the thinner areas, subsoil material has been mixed with original surface soil and has given it a reddish color. In the few small areas of nearly virgin soil under forest, the surface soil is yellowish-brown friable fine sandy loam about 15 inches thick. The top part of this layer (about 3 inches) is brown very friable fine sandy loam that contains a fairly large supply of organic matter from decayed vegetation.

This soil includes areas of Hanceville fine sandy loam, eroded undulating phase. The included soil has a dark reddish-brown to reddish-brown surface soil, a

red to reddish-brown somewhat finer textured subsoil, and generally a somewhat greater depth to bedrock.

Use and suitability (IIe–3).— Practically all the inextensive area of Linker fine sandy loam, eroded undulating phase, has been improved for crops. Most of it is used annually for row crops, chiefly corn and cotton. The soil has very good to excellent workability. Tilth is excellent, and the moisture-absorbing qualities are very good. The hazard of further erosion is slight to moderate, but most areas of the soil will develop thin or bald spots unless good conservation measures are practiced.

If the required plant nutrients and organic matter have been supplied and moisture and soil have been conserved, this soil is well suited to winter legumes. The more severely eroded areas are better suited to cotton than to corn, unless erosion has been controlled and a better surface soil has been developed. The soil responds very well to good management. It is very similar to Hartsells fine sandy loam, eroded undulating phase, in use capability and plant-nutrient requirements.

Linker fine sandy loam, eroded rolling phase (5 to 10 percent slopes) (Le).—This soil has stronger slopes than Linker fine sandy loam, eroded undulating phase. Consequently, more of its original surface soil has been lost through erosion, and the present plow layer contains a greater proportion of reddish subsoil material. Shallow gullies have developed in places. Although the slopes normally range from 5 to 10 percent, slopes up to nearly 15 percent occur in places. These more strongly sloping areas are on the easterly slopes of the outer bluffs of Lookout Mountain south of Collbran, and they extend south of Collinsville. A few are in the southern part of the county east or southeast of Collinsville. The positions on the uplands occupied by Linker fine sandy loam, eroded rolling phase, are similar to those occupied by Hartsells fine sandy loam, eroded rolling phase, in all areas except those having slopes greater than 10 percent.

Runoff is medium, and internal drainage is rapid. The moisture-holding capacity is moderate. The areas of this fairly extensive soil are small to rather large. They are principally on the southern part of Lookout Mountain. Other areas are on other parts of Lookout Mountain and on Sand and Fox Mountains.

As mapped, the soil includes areas of Linker sandy clay loam, severely eroded rolling phase, and Hanceville sandy clay loam, severely eroded rolling phase. These inclusions have redder and finer textured surface soils. In addition, the Hanceville soil has a somewhat redder and finer textured subsoil. On some of the stronger slopes, areas of Hanceville fine sandy loam, rolling phase, are included. These areas are characterized by a dark reddish-brown surface soil and a red to reddish-brown friable subsoil. The subsoil texture is somewhat finer than that of Linker fine sandy loam, eroded rolling phase.

Use and suitability (IIIe–3).—About 65 percent of Linker fine sandy loam, eroded rolling phase, is used annually for row crops, mainly cotton and corn. A fairly large acreage is planted to watermelons for marketing. The soil is well suited to sericea lespedeza pasture, and more areas are being planted to this type of pasture. Several areas, some fairly large and severely eroded, have reverted to forest, mainly pine. A few are idle or in unimproved range pasture. The volunteer grasses have little grazing value.

This soil has good workability. Erosion, however, has impaired its tilth and moisture-absorbing qualities. Unless good conservation practices are used, only a small part of the moisture that falls on the surface will be absorbed. The soil generally is better suited to cotton than to corn, but under practices that conserve moisture and soil, the difference in suitability is not very great. The response of the soil to good management is excellent. The included areas of stronger slopes, however, are not suitable for cultivation unless runoff and erosion are controlled.

LITZ SERIES

The Litz series consists of immature soils that are shallow to very shallow to bedrock. These soils were derived largely from material weathered from shale. They are associated mainly with the shales that underlie Fort Payne chert and the shales (especially the gray shales) of the Red Mountain formation. The parent material was derived from acid and calcareous shales, which were interstratified with thin beds of limestone and gray, fine-grained sandstone. For the most part, the parent material was derived from gray shales; however, in places it is from red shale because the beds include the Red Mountain formation, which is made up of interbedded gray sandstone and shale in the upper part, red to gray shales in the lower part, and a fairly thick layer of red sandstone and shale in the middle.

Litz soils occur mainly on the eastern ridge, where they occupy the northwestern slopes toward Big Wills Valley, and on the western ridge, where they are on the southeastern slopes toward Dugout Valley. A few areas occur on other strong slopes in the valleys and on the northwestern slopes of Pudding Ridge in Deer Head Cove. Most of the soils are on hilly and steep slopes, but some are on gently rounded ridgetops.

Litz soils, in general, are relatively free from sandstone or chert fragments. In some places, however, an abundance of fine-grained gray sandstone fragments occur in the soil, and in others red sandstone fragments occur on the surface or in the soil. In some areas chert fragments are on the surface, especially in areas sloping toward Dugout Valley and on the slopes of Pudding Ridge.

As mapped, the Litz series includes some areas of brown soils that have a reddish subsoil. Such soils have usually been classified in the Armuchee series in other counties. They have developed from materials weathered from red or reddish shale interbedded with limestone. The parent material is red or reddish but is otherwise similar to that of the Litz soils.

The Litz soils are slightly to strongly acid, very low to low in supply of organic matter, and low in fertility. Permeability is moderate in the surface layer and moderately slow in the subsurface layer. The moisture-holding capacity is very low to low. These soils have low productivity and a narrow range of suitability. They are principally in forest.

Litz silt loam, rolling phase (5 to 12 percent slopes) (Lm).—This excessively drained soil occurs on rounded tops of shaly ridge spurs and on benches on stronger slopes. The tops of the associated main ridges generally are of chert formation, but relatively short

prongs of shale formation extend at somewhat lower levels at nearly right angles to the main ridge. The shale formation occurs especially in places on the eastern ridge and on the northern part of Pudding Ridge in Deer Head Cove. The soil is generally deeper to bedrock than the hilly and steep phases of Litz silt loam, and therefore is less typical of the series.

Runoff and internal drainage are medium. The natural vegetation consists of species of oak and hickory, beech, yellow-poplar, common persimmon, sweetgum, black tupelo, black walnut, black locust, and some birch, shortleaf, loblolly, and Virginia pines, and redcedar.

Profile description:

Surface soil—
- 0 to 1½ inches, very dark-brown, very friable, highly organic silt loam; the organic matter is brownish gray and consists of both well decomposed and partly decomposed leaves, bark, and twigs; the organic material is loosely combined with the light-gray mineral soil.

Subsurface—
- 1½ to 12 inches, brownish-yellow friable silt loam, shaly silty clay loam, or shaly clay; pale yellow to very pale brown when dry, slightly plastic when wet; material breaks in angular platy or blocky fragments ½ to 2 inches in diameter.

Parent material—
- 12 inches +, mainly unweathered gray shale fragments mixed with pale-yellow, brownish-yellow, and yellowish-red partly weathered shale fragments.

The depth to bedrock is 1 to 2 feet. Generally the surface is fairly free of rock fragments. In some places, however, it is covered with gray fine-grained sandstones, in others with more or less porous red sandstones, and in others with light-colored chert fragments.

Use and suitability (IVe–3).—The areas of this soil are small and fairly inaccessible. They are under natural forest cover, but the trees have been cut from time to time. Pine is probably more prevalent than in the original forest.

The soil has good workability but it is highly erodible. It is subject to sheet erosion. In addition, gullies form, especially the shallow, broad, V-shaped gullies.

If cropped, the virgin soil would lose most of its better qualities, even under good conservation practices, unless it were used mainly for close-growing crops, hay, or improved pasture. Row crops are not suited, because of the shallowness and erodibility of the soil. The response of the soil to good management is medium. Under present conditions most of the least accessible areas can be used best for trees, especially pine.

Litz silt loam, hilly phase (12 to 25 percent slopes) (Ll).—This soil is similar to Litz silt loam, rolling phase, in parent material, profile development, and soil characteristics. It differs mainly in having steeper slopes and generally less depth to bedrock. Runoff is rapid, and internal drainage is medium.

The surface soil consists of very dark-brown, very friable, highly organic silt loam about 1½ inches thick. The subsurface layer is brownish-yellow friable silt loam, shaly silty clay loam, or shaly clay. The depth to bedrock ranges from ½ to 1½ feet.

In many areas on the northwestern slopes of the eastern ridge there are many sandstone fragments on and in the soil. These fragments were derived from the interbedded sandstone layers. On the areas sloping toward Dugout Valley, in places on the slopes of Pudding Ridge in Deer Head Cove, and on some other slopes, few to many chert fragments cover the surface. This chert was derived from the overlying chert formations, especially the Fort Payne chert. The areas deeply covered with chert are included with Clarksville soils, and in places the boundary between this Litz soil and Clarksville soil is arbitrarily drawn on the map.

Use and suitability (VIe–3).—Most areas of this inextensive soil have never been cleared. They have an almost native forest cover, although they have been cut over from time to time. Some areas have reseeded, largely to pine.

The soil has fair workability. The moisture-absorbing qualities, however, are fairly good. The soil is used mainly for timber and other forest products. It is doubtful if any other use would be better suited, because this erosive soil needs the protection of a forest cover. It is possible, however, that more pine and other useful commercial trees could be established under good forestry and fire-control practices.

Litz silt loam, steep phase (25 to 45 percent slopes) (Ln).—This is the most extensive Litz soil in the county. It occupies steep slopes that are broken and rough in places. The surface is more broken than on Litz silt loam, hilly phase. Some slopes are very steep, but the shale formations do not form perpendicular or overhanging bluffs like those of sandstone or limestone. The natural vegetation is mainly deciduous hardwoods mixed with scattered pines and redcedars. Runoff is very rapid, and internal drainage is medium.

Use and suitability (VIIe–3).—Most of this soil has never been cleared. The native forest has been cut over from time to time. Some areas may have reseeded to a higher percentage of pine than was in the virgin stands.

The soil has poor workability, and it is highly susceptible to erosion. It is best suited to forest. The kinds of trees and quality of the timber can be improved by good forestry practices, including better fire control.

Litz shaly silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Lh).—This soil consists of rolling areas that were eroded after they had been cleared and used for crops or pasture. It occupies areas on ridgetops and on benchlike positions on lower slopes. Runoff and internal drainage are medium.

This soil has lost practically all, or all, of the original surface soil and part of the subsurface layer. The present plow layer is almost entirely a mixture of subsurface material and partly weathered shale. It consists of brownish-yellow friable shaly silty clay loam or shaly clay. The subsurface layer is about 5 inches thick and consists of practically the same kind of material as the plow layer. The depth to bedrock ranges from ½ to 1½ feet. Nearly unweathered shale is exposed in places.

Use and suitability (VIe–3).—The soil has been used mainly for row crops, chiefly cotton and corn. Under present practices about half of the soil is idle each year, or is used for range pasture. A few areas have reverted to pines and other trees.

The soil is highly susceptible to further erosion. Workability is fair. Productivity is low because the soil is droughty and makes only medium response to good management. However, some of the better maintained cropland can be continued in row crops under

careful management. A large supply of organic matter should be incorporated into the soil to rebuild its productivity. Under good management, some success has been obtained by using the soil for close-growing and deep-rooted hay or pasture crops, such as sericea lespedeza. Other pasture has been fairly satisfactory on areas that retain some of the original surface and subsurface materials. Such areas are properly seeded and otherwise well managed. At the present time, improved pasture of sericea lespedeza is the best use for most of this soil. Areas not suitably located for pasture are best used for pine forest.

Litz shaly silty clay loam, eroded hilly phase (12 to 25 percent slopes) (Lg).—This soil has lost nearly all the original silt loam surface soil in about half of its area. The rest has lost all the surface soil and, in places, part of the subsurface layer or some of the shaly parent material. Some areas are badly gullied. Erosion has been more severe than on Litz shaly silty clay loam, eroded rolling phase. This eroded hilly phase has rapid runoff and medium internal drainage.

The present plow layer is a brownish-yellow friable shaly silty clay loam or shaly clay that is similar to the underlying subsurface material. The depth of the soil to bedrock is ½ to 1½ feet.

Use and suitability (VIe–3).—In the past this inextensive soil has been planted chiefly to row crops, for which it is poorly suited. Nearly half of it is now idle, and the rest is used principally for corn and cotton. Some areas have reverted to forest, but very few, if any, forests have been developed by planting seedlings.

The soil can be worked fairly easily. The hazard of further erosion is high. The soil is fairly droughty, and droughtiness increases as more loose soil is eroded. The response to good management is only medium. Aside from forest, sericea lespedeza pasture is the only suitable use for this soil.

Litz shaly silty clay loam, eroded steep phase (25 to 45 percent slopes) (Lk).—This soil differs from Litz silt loam, steep phase, in having been cleared and exposed to severe erosion. Nearly all or all the thin surface soil and, in most places, part of the subsurface layer have been lost. Runoff is very rapid, and internal drainage is medium. The moisture-holding capacity is very low.

The present plow layer is mainly partly weathered shale derived from the subsurface layer and parent material. It is brownish-yellow, friable shaly silty clay loam or shaly clay. The subsurface layer is similar to the plow layer.

Use and suitability (VIIe–3).—About half of the very small acreage of this soil is used annually for crops. The rest is idle or is returning to forest—mainly redcedar and pine—by voluntary reseeding.

Chiefly because of the very poor workability and very high erodibility of this soil, satisfactory production is difficult to maintain. The soil can be used best for forest.

MELVIN SERIES

The soil of the Melvin series is poorly drained. It occurs on the flood plains of streams in the limestone valleys. The parent material is general alluvium that washed from uplands underlain chiefly by high-grade limestone. It is modified to various degrees, however, by materials from sandstone, cherty limestone, dolomitic limestone, chert, gray shale, and red shale. This soil has medium productivity and a narrow range of suitability.

The Melvin soil is slightly acid. It has a moderate supply of organic matter and is medium in fertility. The surface soil is moderately permeable, and the subsoil is slowly permeable. The moisture-holding capacity is high.

Melvin silt loam (0 to 2 percent slopes) (Ma).—This soil occurs in level or nearly level first bottoms and is periodically overflowed by streams. It is closely associated with Lindside and Huntington soils of the first bottoms and with Robertsville soils of the low stream terraces. The Melvin soil occupies the most poorly drained positions on the flood plains in the limestone valleys. It is more poorly drained than the associated Lindside soils. Its parent alluvium is generally similar to that of the Huntington and Lindside soils. The alluvium varies from place to place because it came from different rocks.

Runoff and internal drainage are very slow. If outlets can be provided, the drainage can be improved artificially. The natural vegetation is mainly deciduous hardwoods but includes scattered pines and redcedars. The hardwoods are dominantly water-tolerant trees, chiefly water, post, and laurel oaks, hickories, elms, ash, persimmon, and gums.

Profile description:

Surface soil—
0 to 12 inches, dark yellowish-brown to yellowish-brown friable heavy silt loam distinctly mottled with pale yellow, light brownish gray, yellowish red, and reddish yellow; when dry, the material is light gray and has many distinct medium mottles of yellowish and brownish shades; sticky and plastic when wet.

Subsoil—
12 to 30 inches, mottled grayish-brown and light olive-brown firm to friable silty clay loam to silty clay; when dry, the material is pale brown and has common, faint, medium light-gray and brownish-yellow mottles; sticky and plastic when wet; hard when dry.

Underlying material—
30 inches +, mottled alluvium originating principally from high-grade limestone and to a minor extent from sandstone and shale.

Bedrock occurs at depths of 5 feet or more. Most areas of the soil consist of recent alluvium, at least on the surface, although in some areas the alluvium is old. Usually the old alluvium is grayer, firmer and tighter, and more acid than the recent alluvium. Furthermore, it ranges in texture from silt loam and very fine sandy loam to a silty clay loam. Fine sand and very fine sand in various quantities occur in places, especially in Sand Valley, along streams flowing from Sand Valley, and in Little Wills and Railroad Valleys.

Use and suitability (IVw–1).—Melvin silt loam is too poorly drained to use for general crops. However, many areas or parts of areas can be drained for corn, soybeans, and annual lespedeza or other hay crops. Nearly all areas can be improved for pasture. One of the best mixtures for pasture consists of Ladino clover and Kentucky fescue, although other mixtures have been successful.

The soil has poor workability, except where its drainage has been improved. Workability is good in those areas that have been sufficiently well drained for crops. Tilth is also good, and moisture-absorbing qualities are good to excellent. This soil is not subject to ordinary

erosion, but floods may cause some stream erosion. Flooding, which usually occurs in winter and early in spring, deposits new alluvial material in most areas. Floods seldom injure the crops during the growing season, however. Excess surface water should be removed, but adequate outlets are difficult to install on the lower lying, semiponded areas. Response to good management is very good if the practices include adequate drainage for the crops commonly grown.

MINVALE SERIES

The Minvale series consists of well-drained soils on the foot slopes of the chert ridges. These soils have a light-colored surface soil and a reddish-colored subsoil. They are closely associated with Fullerton, Clarksville, Hermitage, Pace, and Greendale soils. They resemble the Fullerton soils very closely in source of parent material and in color of the profile. Formerly the Minvale soils were included in the Fullerton series, but in some sections they were mapped as colluvial phases of that series.

The Minvale soils were derived from old colluvium and local alluvium originating mainly from cherty dolomitic limestone, whereas the Fullerton soils were derived from material that weathered from cherty dolomitic limestone. The positions occupied by Minvale soils are similar to those occupied by Hermitage, Pace, and Greendale soils, but they are somewhat higher.

The original forest cover of the Minvale soils was probably mainly deciduous hardwoods. Some redcedars grow in places. The few forested areas are now mainly in pine.

The Minvale soils vary greatly in content of chert. Some areas are nearly free of chert, especially in the surface soils; others are very coarsely cherty throughout the profile. In some places the silt loams are relatively free of chert fragments to depths of more than 48 inches, but in most places they contain various amounts of chert in the subsoil and underlying material. In cultivated fields most silt loams are very cherty in spots. The cherty silt loams are moderately cherty to very cherty.

The Minvale soils are medium to strongly acid, low in supply of organic matter, and low to medium in fertility. Permeability is moderate to moderately rapid in the surface layer and moderate in the subsoil. These soils have medium productivity and a very wide to wide range of suitability.

Minvale cherty silt loam, eroded undulating phase (2 to 5 percent slopes) (Mc).—This somewhat eroded cherty soil occurs on fairly gentle foot slopes and in undulating benchlike positions on stronger slopes that are associated principally with chert ridges. The soil has lost half or more of its original surface soil through erosion. In places the surface soil has been so eroded and mixed with reddish material from the subsoil that it has a reddish cast. Newly plowed areas may appear relatively free from chert fragments, compared with a rain-packed surface. Runoff is slow to medium, and internal drainage is medium. The moisture-holding capacity is moderate.

Profile description:

Surface soil—
0 to 5 inches (plow layer), reddish-yellow to strong-brown friable cherty silt loam; very pale brown to light gray when dry; weak fine crumb structure.

Subsoil—
5 to 27 inches, reddish-yellow to yellowish-red friable cherty silty clay loam to cherty silty clay; reddish yellow when dry, sticky when wet; moderate medium angular blocky structure.

Underlying material—
27 to 37 inches, yellowish-red to red, firm to friable, cherty silty clay loam to cherty clay; sticky when wet.

Bedrock occurs at depths of 5 to 20 feet. In forested areas the surface soil is about 10 inches thick. The top 3 inches is very dark grayish brown and contains a fairly high supply of organic matter.

Use and suitability (IIe–2).—Almost all of this inextensive soil has been cleared. Most of it is used for cotton, corn, hay, and pasture. Potatoes, sweetpotatoes, truck crops, vegetables for home gardens, berries, apples, and peaches are also grown.

The workability of this soil is good. Chert fragments on and in the soil, however, hinder cultivation. The sharp cutting edges of the chert injure plows and other tillage implements. The larger fragments interfere with mowers and other cutting machines that have the cutting bar close to or in contact with the surface of the soil. On the other hand, the chert fragments tend to reduce the susceptibility of the soil to erosion, the evaporation of soil moisture, and the hardening or baking of the surface layer. The coarser chert pieces are commonly removed by hand on many of the better operated farms.

Because this soil warms comparatively early in spring, the growing of berry crops is practical, and also the early planting of truck crops and cotton. This quality of the soil also makes possible the early harvest and marketing of truck and berry crops and the maturity of cotton before it becomes seriously damaged by boll weevils. The response of this soil to good management is very good. The present management practices are usually not so good as for Hartsells and Apison soils on the sandstone plateaus.

Even though the soil is not very erodible, most of its favorable qualities will be lost or adversely affected if erosion continues. Where runoff is not controlled, shallow gully erosion is more active than sheet erosion. Measures should be taken to control erosion and conserve the soil. This soil also needs a greater supply of organic matter. This requirement is being met fairly well through the use of grazing crops and winter legumes for green manure.

Minvale cherty silt loam, rolling phase (5 to 12 percent slopes) (Md).—This soil occupies the colluvial slopes of the chert ridges. It has remained under native forest; consequently, erosion has not been active. The surface layer is a friable cherty silt loam about 10 inches thick. The top part (about 3 inches) is very dark brown, and the lower part is reddish yellow to strong brown. The subsoil, a reddish-yellow to yellowish-red, friable, cherty silty clay loam to cherty silty clay, is about 22 inches thick. Bedrock lies at depths of 4 to 15 feet. Runoff and internal drainage are medium, and the moisture-holding capacity is low.

Use and suitability (IIIe-2).—The forest that covers this soil has been cut over from time to time, and the present trees seeded voluntarily. This soil has good workability. It is moderately erodible, but it can be conserved fairly easily.

Minvale cherty silt loam, eroded rolling phase (5 to 12 percent slopes) (Mb).—After this soil has been cleared and cropped, it loses 50 to 75 percent of the

original surface soil in most areas. In a small acreage nearly all, or all, of the surface soil and, in places, part of the subsoil have been lost.

The present plow layer of this eroded rolling phase usually contains subsoil material brought up during tillage. It consists of reddish-yellow to yellowish-red friable cherty silt loam. The subsoil is reddish-yellow to yellowish-red, friable, cherty silty clay loam or cherty silty clay. This layer is about 20 inches thick. Bedrock occurs at depths of 4 to 15 feet.

Runoff and internal drainage are medium. The moisture-holding capacity is moderate. This fairly extensive soil is closely associated with other soils of the Minvale series and with Fullerton, Hermitage, Greendale, and Clarksville soils. It occurs in all four valleys in the county; a few areas are in Deer Head Cove.

Use and suitability (IIIe-2).—This soil has been used for crops for many years. Most of it is used annually for general farm crops, chiefly row crops, and pasture. A few areas are idle or reseeding voluntarily to forest, mainly pine.

The soil has good workability. Except under a good moisture-conserving system, not enough moisture is absorbed to provide for crops during the growing season. The soil is usually somewhat droughty during moderately long dry periods, even under good moisture-conservation practices. If row crops must be grown, contour tillage, terracing, and other good conservation practices are necessary.

The present level of management, especially in parts of Dugout and Sand Valleys, is relatively low, and returns are correspondingly low. This soil, however, responds very well to suitable management. Under a fairly high level of management, yields of cotton and corn are fairly satisfactory. Such management includes use of grazing crops and winter legumes to supply organic matter and the addition of necessary plant nutrients.

Improved permanent pasture is a good use of this soil, especially on strongly rolling or sloping areas that are favorably located. Sericea lespedeza makes good pasture, with or without an overseeding of rescuegrass. A few areas not conveniently located for improved pasture are well suited to pine. Few areas have been planted to pine, but some farmers are showing an increased interest in establishing seedling stands on their idle land.

Minvale silt loam, eroded undulating phase (2 to 5 percent slopes) (Mf).—This soil differs from Minvale cherty silt loam, eroded undulating phase, mainly in having parent material that was less cherty or that had finer chert fragments. The quantity of chert in the soil varies, and some areas are nearly free of chert. Consequently the separation of the silt loam from the cherty silt loam on the soil map is largely arbitrary. Most areas contain a few to several small cherty spots too small to outline on the soil map.

Runoff is slow to medium, and internal drainage is medium. The moisture-holding capacity is moderate to high. This fairly extensive soil developed under forest. It is closely associated with other members of its own series and with Fullerton, Hermitage, Pace, and Greendale soils.

Profile description:

Surface soil—
: 0 to 5 inches (plow layer), reddish-yellow to strong-brown friable silt loam; very pale brown to light gray when dry; contains a few small chert fragments; weak fine crumb structure.

Subsoil—
: 5 to 27 inches, reddish-yellow to yellowish-red friable silty clay loam to silty clay; contains some grit and small chert fragments; reddish yellow when dry, sticky when wet; moderate medium angular blocky structure.

Underlying material—
: 27 to 37 inches +, yellowish-red to red, firm to friable, silty clay loam or clay; contains some grit; sticky when wet.

The depth of the soil to bedrock ranges from 5 to 20 feet. In virgin areas the surface soil is about 10 inches thick. This surface layer is very dark grayish brown in the first 3 inches, and it contains a fairly large quantity of organic matter but only a few particles of grit and chert.

Use and suitability (IIe-2).—Most of this soil is used annually for row crops, chiefly corn and cotton. It is well suited to soybeans for hay, grain sorghum, sorghum for sirup, and other minor crops.

Workability is very good, and tilth is fairly good. The hazard of further erosion is slight to moderate. The response to good management is very good.

Minvale silt loam, eroded rolling phase (5 to 12 percent slopes) (Me).—This soil occupies stronger slopes and is more eroded than Minvale silt loam, eroded undulating phase. The soil occurs on the colluvial slopes of chert ridges. Although the total range in slope is 5 to 12 percent, most slopes range from 5 to 9 percent. Runoff and internal drainage are medium. The moisture-holding capacity is moderate to high.

The present plow layer generally contains some subsoil material brought up by tillage. It consists of reddish-yellow to yellowish-red friable silt loam in which there are a few small chert fragments. The subsoil is reddish-yellow to yellowish-red friable silty clay loam to silty clay; it is about 20 inches thick and contains some grit and small chert fragments. Bedrock occurs at depths of 4 to 15 feet.

A very small acreage is uneroded and under forest. Some areas are severely eroded, and gullies have formed in places. Gullied or otherwise severely eroded areas and spots are indicated on the soil map by symbols.

Use and suitability (IIIe-2).—Nearly all the fairly large acreage of Minvale silt loam, eroded rolling phase, has been used for crops for a number of years. Row crops, chiefly corn and cotton, have been grown.

The soil has good workability. The hazard of further erosion is moderate. Although the soil is leached of all soluble carbonates and is inherently medium in plant nutrients, it responds very well to good management.

Except in severely eroded areas, this soil is fairly easy to maintain in good workable condition. It is better suited to close-growing crops than to row crops. Much of its acreage, however, is required for row crops, and terraces and contour cultivation would be helpful. The more strongly sloping or rolling areas can be used best for hay and pasture. Sericea lespedeza is highly suitable as a pasture plant.

MUSE SERIES

In the Muse series are well drained to somewhat excessively drained soils. These soils have developed on old colluvium and local alluvium that were deposited on foot slopes in the limestone valleys below areas of the Litz, Sequoia, and Tellico soils. The colluvium and

local alluvium originated principally from shale but contain various quantities of materials from sandstone, limestone, cherty limestone, and chert.

Muse soils are mainly along the northwestern edge of Dugout Valley and the southeastern side of Big Wills Valley. Sandstone fragments are more common on the areas in Big Wills Valley and along its eastern border than in Dugout Valley. Chert overwash is more common in Dugout Valley than elsewhere.

The soils of the Muse series have medium to low productivity and a very wide to narrow range of suitability. They are medium to strongly acid.

Muse silt loam, eroded undulating phase (2 to 5 percent slopes) (Mh).—This well-drained soil occupies foot slopes, mainly on the shaly sides of chert ridges. It is associated with other Muse soils and with Litz, Sequoia, and Tellico soils. This soil has slow to medium runoff. Internal drainage generally is medium, but in some nearly level areas it is slow. The supply of organic matter is low to medium, and fertility is medium. Permeability is moderate in the surface soil and moderately slow in the subsoil. The moisture-holding capacity is high. The natural vegetation was chiefly mixed deciduous hardwoods, pines, and redcedars.

Profile description:

Surface soil—
- 0 to 5 inches (plow layer), brown friable silty loam to silty clay loam.

Subsoil—
- 5 to 24 inches, yellowish-red friable silty clay; weak medium subangular blocky structure.
- 24 to 42 inches, reddish-yellow friable silty clay containing a few fine, very dark-brown concretions; moderate medium subangular blocky structure.

Underlying material—
- 42 inches +, friable colluvium or alluvium composed largely of material derived from shale.

The soil varies mainly in depth to bedrock, in texture and color of the profile, and in the numbers of sandstone and chert fragments. Depth to bedrock ranges from 4 to 9 feet. The texture of the profile is commonly silt loam in the surface layer and silty clay in the subsoil, but it may be sandier where a large part of the colluvium comes from sandstones. The color of the soil is directly related to the color of the shale or the shale and sandstone from which the colluvium was derived. The bulk of the colluvium has come from gray or yellowish shales; a small part came from reddish shales. As a result, the color of the soil is commonly yellowish red. Locally, however, much of the colluvium came from red shales and sandstones, such as those of the Tellico formation. The soil itself is then redder than normal.

The soil may contain a few or many sandstone fragments. Most areas have few such fragments, but some have large numbers. These fragments may occur throughout the profile, only in the surface layer, or only in the deeper layers. A few areas of the soil have large numbers of chert fragments in the surface layers. These fragments occur where part of the colluvium came from the Fort Payne chert formation.

As mapped, this soil includes a total of about 100 acres of Alcoa silt loam, eroded undulating phase. Most of this included soil occupies very small areas. It has formed over old colluvium consisting largely of materials originating from red shales of the Red Mountain or Tellico sandstone formation. The colluvium has been modified more or less by materials from sandstone, gray shales, limestone, cherty limestone, and chert. The included Alcoa soil has a dark reddish-gray to dark reddish-brown friable silt loam to silty clay loam surface soil, about 5 inches thick. The subsoil is a red to yellowish-red friable silty clay about 37 inches thick. The Alcoa soil differs from the Muse soil chiefly in having a redder surface soil and subsoil.

Use and suitability (IIe–2).—All the relatively small area of Muse silt loam, eroded undulating phase, has been cleared of forest. This soil is very desirable for agriculture, and nearly all of it is used each year for general farm crops. Corn and cotton are the chief crops. Smaller acreages of soybeans, sorghum, annual lespedeza, and sericea lespedeza are grown. Occasionally, some areas are used for small grains, chiefly oats.

The workability of the soil generally is very good, but in small areas it may be impaired by erosion or by sandstone and chert fragments. The hazard of further erosion is slight to moderate. Many of the less sloping areas have been protected by ditches made from deep natural drains that receive the surface water from higher lying areas. The response of this soil to good management practices is very good.

This soil is well suited to Ladino clover-fescue pasture. Most areas, however, are too desirable for field crops to be put in improved pasture. Winter legumes are suited to this soil.

Muse silt loam, eroded rolling phase (5 to 12 percent slopes) (Mg).—This somewhat excessively drained eroded soil differs from Muse silt loam, eroded undulating phase, mainly in having stronger slopes. Although the slopes range from 5 to 12 percent, only a few are greater than 9 percent. Erosion has removed 50 to 75 percent of the original surface soil. In most places the plow layer consists partly of subsoil material brought up by tillage. Shallow and deep gullies and severely sheet-eroded spots have formed in some places. They are indicated on the soil map by symbols.

Runoff and internal drainage are medium. The supply of organic matter is low to moderate, and fertility is medium. Permeability is moderate in the surface soil and moderately slow in the subsoil. The natural vegetation has been cut from practically all the soil, but a few areas are overgrown with pine trees that have voluntarily reseeded. Few, if any, areas of this soil have been planted to pine seedlings.

Nearly 500 acres of Alcoa silt loam, eroded rolling phase, are included with this soil as mapped. The included soil is mostly in small areas. It has a dark reddish-gray to dark reddish-brown friable silt loam to silty clay loam surface soil about 5 inches thick. Its subsoil, a red to yellowish-red friable silty clay, is about 36 inches thick. The material of this inclusion originated mainly from red shales but to some extent from sandstone, gray shales, limestone, cherty limestone, and chert.

Use and suitability (IIIe–2).—Most of the fairly large acreage of Muse silt loam, eroded rolling phase, is used for row crops, principally corn and cotton.

This soil is easy to work and is moderately erodible. Although the moisture-holding capacity is moderate, the moisture absorption is low if moisture and soil conservation practices are inadequate. This soil is more erodible than Muse silt loam, eroded undulating phase, because of stronger relief and a somewhat shallower profile, particularly on the stronger slopes. Con-

sequently, the problems of conserving moisture and of building up and maintaining the soil are more difficult. Under suitable management the soil can be conserved and kept fairly workable and productive.

The soil responds very well to good management. Under good management it is suited to winter legumes for grazing or for plowing under as green manure. It is well suited to improved sericea lespedeza pasture. If cropland is not available, row crops can be rotated with close-growing crops, mainly those to be used for grazing and hay. The milder slopes can be used frequently for row crops. Terraces, contour cultivation, and other erosion control measures are necessary on all slopes.

Muse silty clay loam, severely eroded rolling phase (5 to 12 percent slopes) (Mk).—This somewhat excessively drained soil lost much of its material through erosion after it had been cleared and tilled. Very little of the original friable silt loam surface soil remains.

This soil has rapid runoff and medium internal drainage. Its supply of organic matter is very low, and its fertility is low. Permeability is moderately slow. This soil is droughty because it absorbs moisture slowly. Heavy showers in summer run off the soil rapidly. The moisture-holding capacity is low.

The present plow layer consists almost entirely of subsoil material. It is yellowish-red friable silty clay loam. The 31-inch subsoil is yellowish-red friable silty clay in the upper part. In the lower part it is a reddish-yellow friable silty clay that contains a few very dark-brown concretions.

Approximately 70 percent of this soil closely approaches Alcoa silty clay loam, severely eroded rolling phase, in characteristics. The surface soil of this included Alcoa soil is dark reddish-brown or reddish-brown to yellowish-red friable silty clay loam; it is about 5 inches thick. The subsoil is about 31 inches thick. The upper part is yellowish-red to reddish-brown friable silty clay. The lower part is yellow, reddish-yellow, or yellowish-red, friable silty clay; it is mottled with these colors in some areas.

Use and suitability (IVe–3).—The small acreage of Muse silty clay loam, severely eroded rolling phase, was used almost entirely for row crops. Erosion became so severe, however, that nearly all of this soil is now idle or in unimproved pasture. Some areas have returned to forest, mainly pine, through voluntary reseeding.

Response to good management is only medium, but this soil can be reclaimed by means of terraces. When reclaimed, it can be put in improved pasture by seeding to sericea lespedeza. Another suitable use is for pine forest, which can be established by planting seedlings or by letting idle areas grow up in trees.

MUSKINGUM SERIES

The Muskingum series consists of excessively drained shallow to deep soils on the sandstone plateaus. These soils are rolling and hilly. They occur in close geographic association with Hartsells soils and, to some extent, with Linker, Crossville, Apison, and Pottsville soils. The parent material was derived mainly from sandstone, but it has been modified in places by materials from shale and siltstone. Colluvial material has accumulated on the surface in places. The depth of the soils to bedrock varies considerably. Outcrops of the sandstone bedrock occur in places.

The original forest was chiefly mixed hardwoods and pines. Virginia pine is now common on most of the shallow stony areas. The trees in some areas are dominantly deciduous hardwoods, among which are various oaks and hickories, yellow-poplar, sweetgum, elm, and maple. Shrubs, vines, and briers are common undergrowth.

The phases of the fine sandy loam type are fairly free of stones on the surface, and in the surface soil and subsurface layer. These phases resemble the uneroded shallow phases of Hartsells fine sandy loam in profile characteristics, but they are more hilly. The stony fine sandy loams of the Muskingum series differ from the fine sandy loams in the quantity of loose sandstone fragments on the surface and in the soil and in the number of sandstone outcrops. They occupy rolling relief in more than half of their area.

The Muskingum soils are medium to strongly acid and low in supply of organic matter and fertility. They have rapid permeability and low moisture-holding capacity. The Muskingum soils have low productivity and a narrow range of suitability.

Muskingum fine sandy loam, hilly phase (10 to 20 percent slopes) (Mm).—This soil occupies hilly and very strongly sloping positions on the sandstone plateaus. In most places it has formed in material weathered from sandstone, but in some places its materials came from mixed sandstone, shale, and siltstone. In some small included areas the slope is less than 10 percent, and in others it is more than 20 percent. The areas of gentle relief commonly occur on rounded narrow ridgetops and on narrow nearly level benches.

This hilly soil has rapid runoff and rapid internal drainage. It is fairly extensive, and its areas are widely distributed over the sandstone plateaus.

Profile description:

Surface soil—
- 0 to 3 inches, dark grayish-brown very friable fine sandy loam; fairly high organic-matter content.
- 3 to 8 inches, grayish-brown very friable fine sandy loam.

Subsurface—
- 8 to 18 inches, yellowish-brown friable fine sandy loam that grades to light fine sandy clay as the depth increases.

Parent material—
- 18 to 24 inches, soft partly weathered sandstone, sandstone fragments, and loose grayish-brown sand somewhat splotched with light grayish brown to strong brown.

Variations occur in the depth to bedrock (1 to 3 feet) and in the quantity of rock fragments on the surface and throughout the profile. In some areas rock outcrops lie in belts or ledges at different levels; in others the surface is practically free of rock. The parent material varies somewhat in quantity of material derived from shale. In some places it is practically free from shale material; in others the quantity of shale material is fairly large. Ordinarily the soil is finer textured where more shale material is present. As mapped, this soil includes small areas of Pottsville soils, especially where the soils of the two series are very closely associated.

Use and suitability (VIe–3).—Most of Muskingum fine sandy loam, hilly phase, is in forest, but the trees have been cut from time to time. In many areas there are now more pines than in the original forest. Some areas have been cleared for pasture or crops. The most

common crops are corn and cotton. Watermelons are occasionally grown as a cash crop.

The soil has fair workability, but areas that are fairly stony or have occasional outcrops of bedrock are less favorable. Tilth is good. Moisture absorption is good to moderately good, depending on the slopes and the friability and porosity of the surface soil. The response of this soil to good management is only medium. The soil is best used for forest or for improved pasture. Lespedeza is the most suitable pasture plant for this soil.

Muskingum fine sandy loam, eroded hilly phase (10 to 20 percent slopes) (Ml).—This soil is similar to Muskingum fine sandy loam, hilly phase, in all characteristics except erosion. After this soil had been cleared for cultivation, erosion removed 50 to 75 percent or more of the surface soil from most areas. Most of the cultivated slopes range from 10 to about 16 percent; very few exceed 16 percent. Runoff and internal drainage are rapid.

The present plow layer is grayish-brown to yellowish-brown very friable fine sandy loam. The 7- to 10-inch subsurface layer is yellowish-brown friable fine sandy loam. It grades to friable light fine sandy clay as the depth increases. Because of its favorable texture, the present plow layer has nearly the same desirable tilth and moisture-absorbing qualities as the original surface soil.

Use and suitability (VIe–3).—This fairly extensive soil developed under forest, but all of it has been cleared. About half of it is now used for row crops; other areas are in unimproved pasture or idle. A small part has voluntarily reseeded to pine. Corn is the chief crop, although cotton and soybeans are occasionally grown. A few areas are used for the commercial production of watermelons. Small acreages of potatoes, sweetpotatoes, field peas, and sweet sorghum are grown. Tomatoes and cabbage are grown as truck crops.

The soil has fair workability, good tilth, and fairly good moisture-absorbing qualities. It is highly erodible. Shallow gullies develop fairly readily, and deep gullies occur frequently in neglected areas.

Northern and eastern slopes are better suited to crops than southern or western slopes. Very few areas can be used continuously for row crops without causing more erosion. Many farmers, however, grow row crops fairly well by terracing and by cultivating on the contour. Most areas can be conserved fairly well by sowing close-growing crops for pasture or hay. Sericea lespedeza is one of the best crops for this purpose. It requires about a year to become established and, with proper care, will last for many seasons.

The response of this soil to good management is only medium. If the soil cannot be properly managed, it is best used for pine trees.

Muskingum stony fine sandy loam, rolling phase (5 to 10 percent slopes) (Mo).—This very shallow to moderately deep soil has a poorly developed profile. Sandstone bedrock, boulders, and small fragments occur over much of the surface. The soil has formed mainly from sandstone materials, but in places it contains materials from shale and siltstone. The surface area occupied by rock ranges from less than 5 percent to nearly 30 percent, but it is lower than for Muskingum stony fine sandy loam, hilly phase. In some areas the gradient is 2 to 5 percent.

This soil has medium runoff and moderate internal drainage. Seepage occurs in places during wet periods, especially during winter and early in spring. A mixture of deciduous hardwoods and pine is the most common forest cover. In some places, however, the trees are mainly deciduous hardwoods. In others they are mainly pine, chiefly Virginia pine, which grows on very shallow stony soil. This extensive soil occurs in nearly all parts of the sandstone plateaus.

Profile description:

Surface soil—
- 0 to 3 inches, dark grayish-brown very friable stony loam; contains considerable organic material from decayed leaves and other decayed vegetation.
- 3 to 8 inches, grayish-brown very friable stony fine sandy loam.

Subsurface—
- 8 to 18 inches, yellowish-brown friable stony fine sandy loam, grading with depth to friable, stony, light fine sandy clay loam.

Parent material—
- 18 inches, soft residual material from weathered sandstone, mixed with sandstone fragments.

The depth to bedrock ranges from 0 to 2½ feet. As mapped, this soil includes small areas of Crossville loam, rolling phase, Hartsells fine sandy loam, rolling shallow phase, and Apison loam, rolling phase. The areas are so intricately associated that their separation on a map of the size used is not practical.

Use and suitability (IVe–3).—Nearly all of Muskingum stony fine sandy loam, rolling phase, is in cutover forest. In some areas it is probable that the present forest contains more pine than the original. About 50 acres that have been cleared and used for pasture or crops have been moderately to severely eroded.

The workability of the soil is fair, tilth is poor, and moisture absorption is good. The soil is highly erodible. Its response to good management is medium.

The soil is used mainly for forest. It is possible that selected areas will make satisfactory pasture. Most areas are too stony for row crops or for any close-growing crops except clover and grasses seeded for pasture. Small fields in selected areas of the included soils are suitable for crops. On the whole, the soil can be used best for pine trees. Some areas, however, are too shallow to support heavy growth, and many trees have fallen before they attained sawlog size.

Muskingum stony fine sandy loam, hilly phase (10 to 20 percent slopes) (Mn).—This very shallow to moderately deep soil resembles Muskingum stony fine sandy loam, rolling phase, in profile characteristics, but it occurs on stronger slopes and hilly positions. In addition, more of its surface is occupied by outcrops of bedrock and boulders and smaller rock fragments.

Runoff and internal drainage are rapid. The natural vegetation is principally deciduous hardwoods and pine. The forest is fairly heavy on northern and eastern slopes. It is lighter on western and southern slopes, except in areas that have considerable seepage from higher lying soils.

This fairly extensive soil occurs mainly along the moderately rough and hilly areas that border the larger stream valleys of the sandstone plateaus and along lateral drains that have cut relatively deep channels into the plateau uplands. The soil is closely associated with other soils of the Muskingum series and with Hartsells, Apison, Pottsville, and Crossville soils. In many places the Muskingum and Pottsville soils are so intri-

cately associated that small areas of Pottsville soils were included in this mapping unit. A very few areas of Crossville soils, Hartsells fine sandy loam, rolling phase, and Apison loam, rolling phase, also were included.

Use and suitability (VIe–3).—A small part of this soil has been cleared and is used for crops and pasture.

The soil has poor workability. The erosion hazard is high. It has less favorable tilth and moisture absorption than Muskingum stony fine sandy loam, rolling phase, but in many areas it receives a better supply of moisture from seepage. In this soil the tree roots penetrate between the layers of rock, and their footing is therefore more secure than in many areas of milder relief. The trees that occupy ravines and foot slopes tend to grow tall and straight and are damaged less by strong winds.

This soil is poorly suited to crops. Some areas might be fairly suitable for improved pasture or woodland pasture, but poor workability and high erodibility restrict the use almost entirely to forest.

OOLTEWAH SERIES

The soil of the Ooltewah series is poorly drained and occurs on colluvial lands in the limestone valleys. The surface soil is yellowish brown to dark yellowish brown. The subsurface layer is distinctly mottled. The soil has parent material similar to that of Abernathy silt loam. It is more poorly drained than that soil and is subject to more frequent ponding or flooding.

The Ooltewah soil is slightly to medium acid. It contains a moderate supply of organic matter and has high fertility. Permeability is moderate in the surface soil and moderately slow in the subsurface layer. The moisture-holding capacity is very high. The soil has high productivity and a medium to wide range of suitability.

Ooltewah silt loam (0 to 2 percent slopes) (Oa).—This soil occurs in depressions, around drainage heads, and on foot slopes. It has formed from recent colluvial and local alluvial materials originating mainly from limestone. Runoff is very slow and internal drainage is slow. Because the soil is too poorly drained for crops, the usefulness of each area depends on the ease with which it can be drained, the efficiency of the drainage system, or both.

The soil has no true native vegetation, because its parent material washed from the surrounding, higher lying soils after they were cleared. The trees and some of the vines and other vegetation present in many areas are native to the underlying buried soil. The areas of this inextensive soil are widely distributed through the limestone valleys.

Profile description:

Surface soil—
  0 to 10 inches, yellowish-brown to dark yellowish-brown friable, heavy silt loam to silty clay loam, faintly mottled in the lower part; pale yellow when dry; very weak fine crumb structure.

Subsurface—
  10 to 30 inches, mottled pale-yellow, brownish-yellow, yellowish-brown, and gray friable heavy silty clay loam to silty clay; many distinct mottles of medium size; when dry, light yellowish brown, faintly mottled with light gray and brown; sticky when wet.

Underlying material—
  30 inches, recent colluvium or local alluvium consisting of mottled friable silt loam to silty clay.

The depth to bedrock is 5 feet or more. The recently accumulated material is usually friable throughout a fairly wide range of moisture content. Where the material is old or consists of a buried soil, it is tight and, when wet, it is plastic and sticky. In a few acres the surface soil and the subsurface layer are gray, firm, heavy clay loam or silty clay that is sticky when wet. This variation occurs in small depressions and swales, where it is associated with Dowellton and Colbert soils. The areas are mainly in Big Wills Valley northwest of Fort Payne.

Use and suitability (IIw–1).—Corn has been the chief crop in the past. Some areas are used for hay and common pasture. Occasionally cotton is grown on well-drained areas included with surrounding soils that are suited to this crop. Many areas of this soil are included with associated lower lying soils that are in improved permanent pasture.

Where adequately drained, the soil has good workability, excellent tilth, and usually very good moisture-absorbing qualities. Inasmuch as the moisture-holding capacity is very high, artificial drainage should be deep enough to permit good aeration, particularly for corn, soybeans, or other row crops. Deep drainage is not necessary for grass production. Grasses and whiteclover do very well if the stagnant water is drained from the surface. The soil is not erodible. On the contrary, some areas receive deposits of colluvial wash from time to time. These deposits seldom damage the soil, but they may cause some loss of the growing crops.

The response of this soil to good management is medium. Such management includes adequate drainage for the crops commonly grown. Some areas have been drained so well that either crops or pasture can be grown successfully. Open ditches are most commonly used for draining, but tile can be used if the outlet is ample.

The soil is not well suited to winter legumes, because it has a high water table. The supply of organic matter is usually sufficient to make green-manure crops unnecessary. Crops grown on areas that are fairly low in organic matter should be rotated with improved whiteclover-fescue pasture. The soil is fairly well suited to soybeans and to other hay crops.

PACE SERIES

The Pace series consists of well drained to moderately well drained light-colored soils of colluvial lands. These soils occur on the foot slopes of chert ridges and in other cherty areas in the limestone valleys. The forest under which the Pace soils developed was largely mixed hardwoods and pines. Redcedar grew in places.

The Pace soils are closely associated with Clarksville, Fullerton, Minvale, and Greendale soils. Like the Minvale soils, they developed from old colluvium and local alluvium originating from cherty dolomitic limestone, but they occupy lower and smoother positions that are less well drained because they receive seepage for a longer time. Unlike the Greendale soil, which has little or no textural profile development, they have well developed to fairly well developed textural profiles. A more or less cemented pan occurs in the lower subsoil or in underlying material. This layer is nearly impervious to moisture.

The Pace soils are medium to strongly acid. They are low in organic-matter content and fertility. Per-

meability is moderately rapid in the surface soil and moderate in the subsoil. These soils have a moderate moisture-holding capacity. They are medium to low in productivity and have a wide to very wide range of suitability.

Pace cherty silt loam, eroded undulating phase (2 to 5 percent slopes) (Pb).—This soil occupies foot slopes, benches, and fans near the base of stronger slopes.

It has slow to medium runoff and medium to slow internal drainage. A mottled zone, usually at depths of 14 to 20 inches, indicates that the soil has a high water table during wet seasons. This water table is caused mainly by seepage from higher ground and by the rather firm or tight and, in places, cemented pan that is usually present at 26 to 36 inches.

Profile description:

Surface soil—
- 0 to 11 inches, pale-brown friable cherty silt loam; very pale brown when dry; weak fine crumb structure.

Subsoil—
- 11 to 28 inches, grayish-brown to yellowish-brown friable cherty silt loam to cherty silty clay loam; very pale brown when dry; many cherty fragments, mostly less than 2 inches in diameter; weak fine blocky structure.

Underlying material—
- 28 to 40 inches, mottled grayish-brown, yellowish-brown, and light-red friable cherty silty clay loam to cherty silty clay; many distinct mottles medium in size; material very compact in place; when dry, cemented and very pale brown and distinctly mottled with reddish yellow and white; sticky when wet; many chert fragments, mostly 2 inches or less in diameter; the material breaks down readily to a cherty mass when moist.

The depth to bedrock ranges from 5 to 20 feet. In virgin soil areas the 3-inch top layer is very dark grayish-brown, very friable, cherty or gritty silt loam. It contains much decomposed organic matter from leaves and other vegetation. This layer is light gray when dry. In cultivated areas the surface soil ranges from 5 to 11 inches in thickness, depending largely on the degree of erosion.

The principal variation in the subsoil is in color. In many places, the subsoil is mottled with light gray and reddish yellow. When dry, the very pale-brown color shows a moderate number of distinct medium mottles of white and light gray.

The underlying material varies from place to place in the quantity and size of chert fragments and in the distribution of the chert throughout the profile. In some places a layer of very cherty material may overlie or be covered by a layer of heavy chert-free firm clay. In other places nearly chert-free silty material may occur as a distinct layer. Most areas of this soil are more or less cherty under cultivation, but a few silt loam areas are included that are nearly free of chert.

Use and suitability (IIIw–1).—The relatively small area of this soil is largely in annual crops such as corn and cotton. A very small part is in forest that has been cut over from time to time.

The chert fragments on the surface and in the surface soil affect workability and tilth. These fragments, however, generally do not interfere with tillage. The moisture-absorbing qualities are very good to good. The soil is slightly to moderately erodible. It is leached of all its soluble carbonates and is inherently low in its supply of plant nutrients. However, it responds very well to good management such as applications of mineral fertilizers and use of green manures from leguminous cover crops. The green manures maintain and increase the supply of organic matter and also furnish part of the nitrogen required.

Under similar management practices, this soil produces corn and cotton about as well as Hartsells fine sandy loam, undulating phase, and Apison loam, eroded undulating phase, of the sandstone plateaus. The soil is associated very closely with Minvale silt loam, eroded undulating phase, and has similar use suitability. It warms somewhat more slowly in spring than the Minvale or Hartsells soils. Practically all general farm crops grown in this locality can be produced on this soil. The level of management is not so high as for soils on the sandstone plateaus, but better management practices are becoming more common.

Pace cherty silt loam, rolling phase (5 to 12 percent slopes) (Pc).—This soil is associated with other members of the Pace series. It is mostly under native forest cover. The timber has been cut from time to time, but the soil retains most of its original characteristics. For the most part, it is like Pace cherty silt loam, eroded undulating phase. It differs in having little erosion and stronger slopes. Although the slopes range from 5 to 12 percent, few are stronger than 9 percent. Runoff is medium, and internal drainage is medium to slow.

To a depth of about 3 inches, the surface soil is very dark grayish-brown to dark grayish-brown, very friable, cherty or gritty, highly organic silt loam. Below this depth, and to a depth of about 14 inches, it is a pale-brown friable cherty silt loam. The subsoil and underlying material are similar in color, texture, chert content, and other characteristics to Pace cherty silt loam, eroded undulating phase. The range in depth to bedrock (4 to 18 feet) is generally slightly less.

Use and suitability (IIIw–1).—Few areas of this inextensive soil have been cleared. Most of it is in forest, but a small part is in woodland pasture.

The soil has good workability. The erosion hazard is moderate, and the soil can be conserved easily under cultivation. If cleared for crops and pasture, it would make very good response to good management.

Pace cherty silt loam, eroded rolling phase (5 to 12 percent slopes) (Pa).—This soil consists of areas that have been cleared and cultivated and have lost 50 to 75 percent or more of their original surface soil through erosion. In color it is similar to Pace cherty silt loam, eroded undulating phase, but has lost considerably more soil material because of its stronger slopes. In some places severe sheet erosion has removed nearly all, or all, the surface soil and, in places, some of the subsoil. Shallow and deep gullies occur locally. Severe sheet erosion and gullies are indicated on the soil map by symbols.

This soil is closely associated with Minvale soils and, in places, with Fullerton and Clarksville soils on the upper side of the slopes. It is commonly associated with other Pace soils, and with Greendale soils on the lower side. Although the slope range is 5 to 12 percent, in most areas it is 5 to 9 percent. Runoff is medium, and internal drainage is medium to slow. The areas of this fairly extensive soil are widely distributed. Most of them are small but are usually so located that they can be worked with other soils of greater extent and similar use suitability.

Use and suitability (IIIw–1).—Most of this soil is used for row crops, but continuous use for such crops

damages the soil. Where possible, row crops should be rotated with pasture or other close-growing perennial crops. Some farmers keep the soil in improved pasture, principally sericea lespedeza, for several years and then grow row crops for a few years.

The workability of the soil is good, and tilth is fairly good. The hazard of further erosion is moderate. Conservability is good, but moisture-absorbing qualities have been impaired by the loss of surface soil. Some improvement in the soil can be made by following good conservation practices. Although fertility is low, the soil responds very well to proper management.

PHILO SERIES

The soil of the Philo series occurs on first bottoms and is very closely associated with the Pope and Atkins soils. It is better drained than the Atkins soil and less well drained than the Pope soil. The parent alluvium of these three series is similar and was laid down by the same floodwaters. The Philo soil, however, usually is somewhat coarser in texture than the Atkins, but the difference between the texture of the Philo soil and that of the Pope soil is not so distinctive. In adjoining areas the Philo soil generally has a slightly finer texture than the Pope. The flood plains on which the Philo soil occurs are bordered chiefly by Muskingum soils and, in places, by Hartsells, Apison, and other soils of the sandstone plateaus.

The Philo soil is medium to strongly acid. It has a moderate to low supply of organic matter and is low in fertility. Permeability is moderately rapid in the surface soil and moderate in the subsurface layer. The moisture-holding capacity is high. This soil has medium to high productivity and a wide range of suitability.

Philo loam (0 to 2 percent slopes) (Pd).—This light-colored somewhat poorly drained soil occupies narrow flood plains along permanent streams and intermittent drainageways on the sandstone plateaus. It consists of recent general alluvium derived from uplands underlain mainly by acid sandstone and shale. The material has washed largely from Hartsells, Muskingum, and Apison soils. Some of the alluvium is old, but the surface soil, at least, consists of recently accumulated alluvium. The sharp breaks along the banks of old stream channels are much steeper than 2 percent.

This soil has very slow runoff, but shallow swales and old channels help remove excess surface water. Internal drainage is slow. All the soil is subject to occasional overflow, especially in winter and early in spring. If the strips cleared for tilled crops are fairly long, they may be damaged by stream erosion.

The natural cover is largely deciduous hardwoods. The hardwoods include water, laurel, and willow oaks, sycamore, yellow-poplar, maple, gum, beech, birch, and willows. A few scattered redcedars grow in some areas. Scattered pines occur, as well rhododendron, mountain-laurel, and holly. Numerous vines, briers, and underbrush also occur.

Profile description:

Surface soil—
- 0 to 4 inches, pale-brown to yellowish-brown friable loam; very pale brown or light gray when dry; very weak fine crumb structure.

Subsurface—
- 4 to 15 inches, brownish-yellow friable fine sandy clay loam mottled with gray and brown; mottles are common, distinct, and medium in size; material is very pale brown when dry.

Underlying material—
- 15 to 36 inches, mottled yellow, brown, and gray friable very fine sandy clay to silty clay; mottles are many, prominent, and medium in size; material sticky when wet; weakly stratified in the lower part.

The depth of the soil to bedrock ranges from 2 to 7 feet. In forested or virgin areas the surface soil is dark grayish-brown to grayish-brown friable loam to a depth of about 3 inches. It contains a good supply of organic matter derived from decayed vegetation. In areas where the lower part of the profile is largely old alluvium, the consistence is firmer than usual for this soil, and the texture is generally sandy clay to clay. Most areas, however, especially those near cultivated land, have enough recently deposited material to form a plow layer.

As mapped, Philo loam includes a few small areas of other soils. These inclusions are Atkins soils, Philo fine sand, Philo loamy fine sand, Pope fine sand, and Pope loamy fine sand. Both the included Philo soils are more friable and sandy than Philo loam. The included Pope soils are brown, loose or very friable sandy soils of the bottom lands.

Use and suitability (IIw–1).—About 15 percent of the fairly inextensive area of Philo loam has been cleared and improved for crops or permanent pasture. Approximately 10 percent has been partly cleared to improve the woodland pasture, but many areas remain in unimproved woodland pasture. In several areas of the included sandy soils, pits have been made to obtain sand for plaster and concrete.

Philo loam is easy to work and has excellent tilth. It has very good moisture-absorbing qualities. The erosion hazard is usually none to slight, except where strips of the soil are exposed to rapidly flowing floodwaters. Narrow strips of trees or brush can be planted across the valley at fairly short intervals to check the force of the floods. The soil has low fertility, but if adequately drained, it responds very well to good management.

Because rapid currents are likely to develop in cleared areas during periods of overflow, only small areas of this soil are well suited to crops. Most areas, however, are fairly safe for improved pasture. The soil is very well suited to Ladino clover-fescue pasture if good management is practiced. In favorably located areas, Philo loam is very productive of corn, soybeans, sorghum, and many other crops locally grown, but in most places it is not suitable for cotton.

POPE SERIES

The soil of the Pope series occurs in first bottoms of the larger streams on the sandstone plateaus and is closely associated with Philo and Atkins soils. The Pope soil occupies well-drained bottom lands, the Philo soil occupies somewhat poorly drained bottom lands, and the Atkins soil occupies poorly drained bottom lands. Over a period of time, if the Atkins soil is drained sufficiently, either naturally or by artificial means, it will develop into Philo soil and eventually into Pope soil. Conversely, if the well-drained Pope soil is subject to poor drainage for a long time, it will first develop the characteristics of the somewhat poorly drained Philo soil and then those of the poorly drained Atkins soil.

The Pope soil is medium to strongly acid, moderate to low in supply of organic matter, and low in fertility.

Permeability is moderately rapid in the surface soil and rapid in the subsurface layer. The moisture-holding capacity is moderate. This soil has medium to high productivity and a very wide range of suitability.

Pope loam (0 to 2 percent slopes) (Pe).—This light-colored soil is subject to periodic overflow. It consists of recent general alluvium derived from uplands underlain mainly by acid sandstone and shale. The alluvial material washed from Hartsells, Muskingum, Apison, and other soils. It is similar to that of the Philo and Atkins soils. The slopes generally range from 0 to 2 percent, but short sharp breaks along the main channel or along old channels and swales within an area are stronger. Runoff is slow, and internal drainage is medium. The natural cover is practically the same as that of the associated Philo loam.

Profile description:

Surface soil—
0 to 10 inches, brown friable loam; light gray when dry; weak fine crumb structure.

Subsurface—
10 to 33 inches, strong-brown, friable, heavy silt loam or silty clay loam faintly splotched with gray and yellow; yellowish brown when dry.

Underlying material—
33 to 44 inches, brownish-yellow friable heavy silt loam; yellow to pale brown or very pale brown when dry; sticky when wet.

Bedrock underlies the soil at 2 to 7 feet. Color varies considerably, especially in the more recently accumulated alluvium. Texture also varies. It ranges from fine sandy loam to silty clay but is prevailingly loam.

Use and suitability (IIw–2).—About three-fifths of this inextensive soil has been cleared and is used for crops or pasture. Corn is the main crop; other crops are soybeans, sorghum, and hay. The crops are damaged when the streams overflow. Losses from flooding vary considerably in different flood plains. The use of the soil for crops therefore is governed by the extent of stream overflow.

This soil is very easy to work. It has excellent tilth and very good moisture-absorbing qualities. Although fertility is low, the soil responds very well to good management, particularly proper fertilization. Inasmuch as the soil has a moderate to low supply of organic matter, most areas will benefit by an occasional rotation with a grazing crop. Grazing crops or cover crops are needed to build up the supply of organic matter. This soil is subject to very little or no erosion unless it is exposed to strong stream currents during flood periods. In general it is advisable not to open long continuous areas for crops without leaving narrow strips of brush or trees to check the speed of high floodwater.

POTTSVILLE SERIES

The Pottsville series consists of very shallow to shallow soils of uplands on the sandstone plateaus. These soils have formed largely from weathered products of acid shale. They developed under a forest of mixed hardwoods and pines.

The parent rock consists chiefly of sandy shale and clay shale. Throughout its depth, the sandy shale is more or less mottled or streaked with colors ranging from pale yellow to strong brown. The less weathered parts of the clay shale usually are gray or dark gray, and the partly weathered parts are more or less streaked with yellow, brown, and strong brown. Some of the clay shale is carbonaceous and nearly black and contains one or more mineable coal seams in places.

The sandy and clay shales contain layers of sandstone, siltstone, and indurated shale, or thin to moderately thick beds of sandstone. The bedded and interbedded rocks vary greatly in thickness and composition. The interbedded sandstone layers generally are thin and consist of dark-gray very fine grained rock having a ripply surface. The total thickness of some sandstone layers, however, may be more than 30 feet. In places the sandstone layers are moderately massive in bedding, loose in structure, and pinkish in color.

Soils of the Pottsville series are medium to strongly acid and low in supply of organic matter. Fertility is very low. Moisture-holding capacity is low. These soils have very low productivity and a narrow range of suitability.

Pottsville loam, hilly phase (10 to 20 percent slopes) (Pf).—This excessively drained soil occupies hilly and very strongly sloping areas. Some small gently sloping or rolling areas and some steep areas are included because they are too intricately associated with this soil to be outlined separately on the soil map. Pottsville loam, hilly phase, has formed from residual products derived principally from weathered acid shale.

Runoff is rapid and internal drainage is medium. The surface soil is moderately permeable, and the subsurface layer is slowly permeable. The areas of this fairly extensive soil are distributed over Lookout and Sand Mountains.

Profile description:

Surface soil—
0 to 3 inches, dark grayish-brown friable loam; contains some organic matter from decayed vegetation; very pale brown when dry.
3 to 8 inches, light-gray to pale-brown friable loam; grades into silty clay or shaly silty clay with increasing depth; light gray or very pale brown when dry.

Subsurface—
8 to 15 inches, pale-yellow, pale-brown, or yellow friable very fine sandy clay to shaly silty clay or shaly clay; mottled with gray and brown in the lower part.

Parent material—
15 to 18 inches, mottled pale-yellow, gray, yellowish-brown, yellowish-red, and strong-brown soft weathered shale.

Underlying rock—
18 inches +, gray shale or interstratified thin beds of sandstone, siltstone, and hard shale of different colors.

The depth of the soil to bedrock ranges from ½ to 1½ feet. The thickness of the surface soil varies somewhat, but in general the sandy parent material has given rise to the deeper profiles. Many small platy fragments occur on the surface or in the surface soil in most places.

Use and suitability (VIe–3).—Nearly all of this soil is in forest of deciduous hardwoods and pines. Hardwoods dominate in some areas, and nearly solid stands occur in others. Practically all wooded areas have been cut over from time to time. It is probable that the forest now contains more pines than were in the original stand. Many areas are in woodland pasture; some areas have been partly cleared or partly improved.

The soil has fair workability. It is highly erodible when cleared and put in cultivation. It makes little response to good management practices. Selected areas can be used for improved pasture. Erosion can be very

destructive on this soil, even under the best management, because the depth to bedrock is very shallow to shallow. The soil is well suited to trees and can be used best for timber production.

Pottsville shaly loam, eroded hilly phase (10 to 20 percent slopes) (Pg).—This soil consists of cleared areas that have become eroded. From half to nearly all, or all, of the surface layer has been lost, and in places part of the subsurface layer.

Runoff is rapid, and internal drainage is medium. Permeability is moderately slow in the surface soil (plow layer) and slow in the subsurface layer.

The plow layer contains partly weathered fragments of sandy shale and clay shale, or sandstone, siltstone, and indurated shale. It consists of pale-yellow, pale-brown, or yellow friable very fine sandy clay to shaly silty clay or shaly clay. The subsurface layer is pale-yellow, pale-brown, or yellow friable very fine sandy clay to shaly silty clay or shaly clay having mottlings of gray and brown in the lower part. The subsurface layer is about 4 inches thick and grades into mottled, soft, decomposed shale. Thin platy rock fragments generally occur in this soil in large numbers; very few areas are entirely free of them. These fragments, usually less than 2½ inches in length and 1 inch or less in width, make most areas channery or gravelly.

Use and suitability (VIe–3).—All areas of this inextensive soil have been used for corn and cotton and other row crops. Many areas are now idle or in unimproved pasture, although some are overgrown with trees, principally pine. About half the acreage is used annually for crops. All cultivation is on the contour. Good conservation practices are used on some areas.

The soil is difficult to work and conserve, largely because it is shallow and hilly. Tilth and moisture-absorbing qualities are poor. The soil is highly susceptible to further erosion and is almost impossible to reclaim for crops because it does not respond to good management. It is suitable for improved pasture, but very little of it has been prepared for that use. Those areas not suitable for pasture are best used for forest.

ROBERTSVILLE SERIES

The soil of the Robertsville series is poorly drained. It developed under a forest that consisted mainly of water-tolerant hardwoods. It occurs in limestone valleys, generally on fairly wide nearly level terraces that are only slightly higher than the adjacent first bottoms. The soil has formed on old mixed general alluvium similar to that under the associated Etowah and Capshaw soils. It differs from the associated soils chiefly in being less well drained and in having a mottled subsoil.

The Robertsville soil is medium to strongly acid. It is low in its supply of organic matter and in fertility. Permeability is moderate in the surface soil and very slow in the subsoil. The moisture-holding capacity is moderate. The soil of this series has low productivity and a narrow range of suitability.

Robertsville silt loam (0 to 2 percent slopes) (Ra).—This soil was formed on old mixed general alluvium that came chiefly from limestone but to some extent from sandstone and shale. It has very slow runoff and slow internal drainage. The drainage usually can be improved if open ditches are installed. The natural vegetation includes willow, water, and post oaks, hickories, gum, maples, yellow-poplar, elm, and ash. A few scattered pine, redcedar, and holly trees are in the stand.

Profile description:

Surface soil—
- 0 to 3 inches, dark-brown friable silt loam to silty clay loam; light brownish gray when dry, dark grayish when wet; weak fine crumb to weak fine blocky structure.

Subsoil—
- 3 to 27 inches, light-gray, mottled with pale-brown, brownish-yellow, and reddish-yellow, friable silty clay; grades to silty clay as the depth increases; material, when dry, is white and has a moderate number of distinct, fine, yellowish-brown mottles; sticky and plastic when wet.

Underlying material—
- 27 to 40 inches, mottled gray, yellowish-brown, and brownish-yellow firm, heavy, stiff silty clay; dry material hard and shows many prominent coarse mottles of brownish yellow and light gray; structureless.

The texture of the surface layer varies from silt loam through heavy silty clay loam to very fine sandy loam. The color of the surface soil is modified locally by deposits or reddish-colored alluvial or colluvial material.

A small total acreage of Guthrie silt loam (not mapped separately in this county) is included with this soil. This inclusion has profile characteristics similar to those of the Robertsville soil; it differs principally in that it occupies depressions, mainly on upland areas in the limestone valleys.

Use and suitability (IVw–1).—About half of the fairly extensive area of Robertsville silt loam is forested. Most of the rest is in pasture. Areas of this soil are cleared annually for improved pasture.

The soil is difficult to work, but its workability can be improved by drainage. The soil has been leached of soluble carbonates. Although low in fertility, it responds very well to good management. If adequate drainage is installed, crops such as corn, soybeans, and annual lespedeza can be grown. Areas that occupy relatively shallow depressions or level places cannot be drained easily by artificial means to make them suitable for tilled crops. Nearly all areas can be drained sufficiently for improved pasture, however. In most places wide, shallow, V-shaped ditches are most satisfactory, especially for improved pasture, because they can be cleaned out readily. Areas that are difficult to drain should remain in forest.

ROCKLAND, LIMESTONE, STEEP

Rockland, limestone, steep (Rb) has a general slope range of 25 to 45 percent. It occurs on low bluffs, regularly spaced ledges on the slopes, and areas that encircle limestone sinks. It is rough and broken and is not uniform in composition or relief. Some areas consist almost entirely of limestone bedrock; others consist of large limestone boulders. The spaces between the rocks, as well as the holes in the rocks, are filled with residual and colluvial materials for the most part weathered from limestone and shale but in places from sandstone.

In some areas only a very few limestone outcrops occur and the surface is deeply covered with colluvium derived largely from limestone and shale residues.

Elsewhere large blocks or sandstone boulders are embedded in colluvium originating from limestone and shale. They vary in number and are associated with outcrops on many of the mountain slopes. On the slopes they occur below Rockland, sandstone, steep, and above the colluvial slopes that border valley floors. In some places, however, limestone outcrops extend to the valley floor, and in others they border Stony colluvial land, steep. Most commonly, on the lower side, they border colluvial foot slopes.

Runoff is generally very rapid, but it is slow on a few narrow level benches. Some drainage water enters underground channels through sinks at and near the bases of slopes. Internal drainage is slow, but considerable seepage takes place along rock surfaces and along the bedding planes of the limestone and shale. The natural cover consists of deciduous hardwoods. Some redcedar and pine are in the stand. Nearly solid stands of redcedar occur on the lower slopes in some areas. Practically all the hardwood trees native to this region grow on this land type.

The total extent of Rockland, limestone, steep, is large. The largest areas are between Sand Mountain and Fox Mountain, along the slopes of those mountains in the northern part of the county, and along the slopes of Lookout Mountain. Only small exposures of limestone occur on the slopes of Sand Mountain south of Sulphur Springs that extend to the De Kalb-Etowah County boundary.

In places the slopes on this land type range from 10 to more than 45 percent. Not more than one-fifth of the area, however, has slopes lower than 25 percent. Nearly perpendicular limestone bluffs occur, but they are not so prominent as the sandstone bluffs near the summit of the mountain slopes. Rockland, limestone, steep, is separated from Rockland, sandstone, steep, and Stony colluvial land, steep, largely on an arbitrary basis.

Use and suitability (VIIe–2).—Practically all of this miscellaneous land type is covered with a forest that is sparse in some places and dense in others. Most of the timber has been cut from time to time. Some areas are in woodland pasture.

Almost all areas are unsuitable for improved pasture. A few local spots, however, can be cleared and used for grasses and clover. The land is used best for trees. Most areas are inaccessible, but lumbering is possible if portable sawmills are set up in the most accessible places, and the sawed rough lumber is brought out by motortrucks. Where this transportation is not possible, individual logs are snaked out by cable or by mule power.

ROCKLAND, SANDSTONE, STEEP

Rockland, sandstone, steep (Rd) occurs largely on the upper third of the mountain bluffs and along the deep gorges that border the larger streams on Lookout and Sand Mountains. It includes nearly all areas that have high sandstone escarpments. The relief is predominantly steep (20 to 45 + percent slopes). However, the topography of this land type ranges from roughly undulating and hilly to clifflike.

The soil material was derived largely from the sandstone member of the Pottsville formation. Sandstone material, however, has sloughed over the shale member of this formation and in places over the Bangor limestone formation. Large boulders and huge blocks of sandstone have rolled onto the shale and limestone. Material weathered from sandstone surrounds the boulders and gives rise to most of the present surface soil. In places, this colluvial material includes small areas of Stony colluvial land, steep, particularly where it has a red color.

Runoff is very rapid. Internal drainage is medium in moderately deep to deep sandy areas, but it is slow where this land type is shallow to sandstone, limestone bedrock, and shale. The areas that are shallow to limestone bedrock consist of small inclusions of Rockland, limestone, steep. Areas that are shallow to shale are small inclusions of Pottsville soils.

Use and suitability (VIIe–2).—The rock surface and prevailing steepness of this extensive land type make it unsuitable for cultivation. The land is principally in forest, mainly hardwoods and pines. The forest is usually denser on north and east slopes than on south and west slopes. The trees tend to grow tall and straight in the deep gorges.

Harvesting timber is generally somewhat more difficult than on Stony colluvial land, steep, because sandstone escarpments make the land less accessible. Some areas are in woodland pasture that provides limited grazing.

ROCKLAND, SANDSTONE, ROLLING

Rockland, sandstone, rolling (Rc) occurs in small to moderately large nearly flat glades on the sandstone plateaus. Outcropping sandstone occupies more surface in some areas than in others. The sandstone lies almost flush with the surface of the surrounding soil, particularly on the upper sides and ends of the glades. It dips very gently toward the lower side of the glades, where it lies flush with the surface in some places and drops rather sharply in others. Where it drops, it forms a ledge less than 2 feet to more than 6 feet thick. Several such ledges may occur in one continuous area. The general slope is 5 to 10 percent, but the slope of the rock surface usually is very gentle (less than 5 percent). A few included areas have slopes of 10 to 15 percent.

Rockland, sandstone, rolling, is closely associated with the Crossville and Muskingum soils and in places with the shallow phases of Hartsells fine sandy loam. The soil in this rockland was derived mainly from residual material weathered from fine-grained sandstone and to some extent from material weathered from shale. Most of the very shallow soil is made up of mineral material, and it contains a very high percentage of organic matter derived from decayed vegetation. The soil is very dark brown or very dark gray when wet. The deeper soil in other areas ranges in color from dark brown to yellowish brown and in texture from heavy loam to fine sandy loam.

Runoff is rapid in most areas. Internal drainage is restricted by the underlying sandstone bedrock. Seepage is very common during wet periods, but the soil dries very quickly during hot spells.

The natural vegetation on the glady areas is mainly lichens, grasses, and shrubs. There are very few trees. Virginia pines and other scrubby trees, however, are common along the edges of the outcropping bedrock and where the surface material consists of various quantities of broken rock. Virginia pines are more

common in areas where the soil is deeper. A mixed growth of persimmons, various oaks, hickories, and other hardwoods occurs in places.

Use and suitability (VIIe–2).—On more than 50 percent of its area, this land type is mostly exposed bedrock. It is unsuitable for crops but can be used for woodland pasture where grasses and other plants grow during wet periods. It is of very little value for forest, because storms blow down many of the trees before they attain maturity. Better trees grow on this land type where the soil is comparatively deep or where their roots can follow cracks or crevices in the rocks.

SEQUATCHIE SERIES

The Sequatchie series consists of very deep well-drained soils on terrace lands in the limestone valleys. The parent material of these soils was old mixed general alluvium washed from uplands underlain mainly by sandstone and shale but in places by limestone. The Sequatchie soils have been modified by recent overwash material in places. Some areas have formed from materials washed almost directly from Allen soils of the colluvial lands and from Stony colluvial land, steep.

The Sequatchie soils border practically all the soils of the uplands that occur in the limestone valleys, the soils of the colluvial lands in the limestone valleys, and other soils of the stream terraces. On the upper sides of their slopes, the areas of Sequatchie soils adjoin principally the Fullerton, Talbott, Minvale, Muse, and Capshaw soils. Locally, the areas have been influenced by materials washed from these series.

The soils of the Sequatchie series vary in texture and color within the same area. Some areas are relatively free from coarse waterworn gravel, chert, and angular sandstone fragments. Other areas have various quantities of chert and sandstone fragments on the surface and in the soil. These small fragments do not interfere seriously with cultivation or soil use. The Sequatchie soils have a fairly high sand content in some areas and a low sand content in others. Their parent materials originated from the more sandy uplands, whereas the parent materials of the Etowah and Capshaw soils, also of the terrace lands, originated from the less sandy uplands.

The Sequatchie soils are medium to strongly acid. They have a low to moderate supply of organic matter and are low in fertility. Permeability is rapid in the surface soil and moderately rapid in the subsoil. The moisture-holding capacity is moderate. The soils of this series have medium to high productivity and a very wide range of suitability.

Sequatchie fine sandy loam, undulating phase (2 to 5 percent slopes) (Sb).—This soil occurs on low stream terraces and is associated with Huntington and Lindside soils of first bottoms and with Etowah silt loam, eroded undulating phase, of the high stream terraces. Most areas of this soil are undulating, but some areas with stronger slopes occur on relatively short breaks toward the first bottoms and swales and on the low ridgelike divides or hummocks.

Runoff is slow but it is usually ample to remove excess surface water. Internal drainage is medium. In some nearly level areas mottlings in the lower part of the subsoil indicate slow internal drainage. The natural forest cover was largely deciduous hardwoods. Some pines and redcedars grew in places. Most of this soil is in Big Wills Valley; widely separated areas are in the other valleys.

Profile description:

Surface soil—
- 0 to 9 inches, dark-brown very friable fine sandy loam; light yellowish brown when dry; weak fine crumb structure; some chert and sandstone fragments and waterworn gravel on and in the layer.

Subsoil—
- 9 to 16 inches, yellowish-red friable loam to silty clay loam, faintly variegated with lighter and darker shades; reddish yellow to strong brown when dry; weak fine to medium angular blocky structure.

Underlying material—
- 16 to 36 inches, yellowish-red friable heavy sandy clay loam; slightly lighter in color as depth increases; reddish yellow when dry; contains some waterworn gravel less than 1 inch in diameter and many chert and sandstone fragments mostly less than 2 inches in diameter.

Depth of the soil to bedrock is 5 feet or more. Some gravelly areas occur. The gravel does not interfere with cultivation to any extent but may cause some wear on tillage implements.

Use and suitability (IIe–3).—Practically all areas of this inextensive soil have been cleared. Nearly all the soil is in crops, mainly corn and cotton. Soybeans, sorghum, potatoes, sweetpotatoes, winter oats or other small grains, and hay and grazing crops are grown to a small extent. Most areas are suitable for winter legumes for green manure. The soil is excellent for improved pasture.

This is a very desirable soil for crops. It is very easy to work. Tilth is excellent except in the small gravelly areas, and the moisture-absorbing qualities are very good. The erosion hazard is slight. Nearly all areas are subject to overflow when floodwaters rise above normal, but flooding seldom occurs during the growing season. Although its fertility is low, the soil responds very well to good management.

Sequatchie fine sandy loam, eroded undulating phase (2 to 5 percent slopes) (Sa).—This soil is moderately eroded and in many areas has lost 50 to 75 percent of the original surface soil. Internal drainage is medium in nearly all places. It is rapid in a few areas that have a coarse-textured subsoil.

The present plow layer consists of dark-brown to yellowish-red friable fine sandy loam, loam, or silty clay loam. It contains some angular chert and sandstone fragments and waterworn pebbles. The subsoil and underlying material are similar to those of Sequatchie fine sandy loam, undulating phase. Runoff is slow.

About one-fourth of this soil, as mapped, has rolling relief (5 to 8 percent slopes). It is usually more gravelly and coarser textured than the undulating areas and has rapid internal drainage. Included also are areas of Waynesboro fine sandy loam, eroded undulating phase, and of Waynesboro fine sandy loam, eroded rolling phase. These Waynesboro soils (not mapped separately in the county) differ from the Sequatchie soil mainly in having a red or reddish-brown subsoil, but Waynesboro fine sandy loam, eroded rolling phase, has somewhat stronger slopes.

Use and suitability (IIe-3).—Most of the inextensive area of Sequatchie fine sandy loam, eroded undulating phase, is used for corn and cotton. Small parts are planted to soybeans, sorghum, potatoes, sweetpotatoes, small grains, and hay and grazing crops. The soil is

suited to winter legumes. It will benefit from the use of green manure.

This soil is very easy to work. The erosion hazard is slight. The soil makes very great response to good management.

SEQUOIA SERIES

The soil of this series has been subjected to severe erosion and, as a result, is somewhat excessively drained. It occupies low ridges and mild slopes in the limestone valleys. It has formed on residual material derived chiefly from shale and associated limestone. The soil developed under a native cover consisting principally of deciduous hardwoods, with which pines and a few redcedars were mixed.

The soil of this series is medium to strongly acid, very low in supply of organic matter, and low in fertility. It has low productivity and a narrow range of suitability.

Sequoia silty clay, severely eroded rolling phase (5 to 12 percent slopes) (Sc).—This soil has lost nearly all, or all, its original surface soil and in places part of the subsoil through erosion. The present plow layer consists almost entirely of subsoil material. The general slope is 5 to 12 percent, but a small acreage is undulating (2 to 5 percent slopes).

Runoff is rapid, and internal drainage is medium. The hazard of further erosion is high. Permeability is slow, and the moisture-holding capacity is low.

Profile description:

Surface soil—
 0 to 5 inches (plow layer), reddish-brown to yellowish-red friable to firm silty clay.

Subsoil—
 5 to 13 inches, yellowish-red friable to firm silty clay; reddish yellow, hard, and brittle when dry; plastic when wet; moderate fine subangular to medium subangular blocky structure.

Parent material—
 13 to 18 inches, red, firm, brittle silty clay to shaly silty clay, splotched and streaked with reddish yellow and gray; when dry, the material is hard and reddish yellow and has many distinct light-gray mottles of medium size; plastic when wet; moderate medium angular blocky structure.

Parent rock—
 18 to 36 inches +, mottled yellowish-red, yellowish-brown, and gray shale.

In forested areas the first 2 or 3 inches of the surface soil is friable silty clay loam that is brown when moist but very pale brown to pale brown when dry. The depth of the profile to unweathered shale ranges from ½ to 1½ feet. In some areas spots of unweathered shale are exposed. The parent shale is red or reddish yellow or prominently mottled red, brown, yellow, and gray. Sandstone fragments and sandy fine materials sloughed from the overlying Tellico sandstone formation occur on the surface in places. In other places, chert fragments and cherty soil material sloughed from Fort Payne chert occur.

Use and suitability (IVe–5).—Almost all the small total area of this soil has been used for crops at some time. Nearly half of it is now idle or is returning to forest, mainly pine. Some cultivated areas have been used for a number of years for corn and cotton. The soil is less suited to corn than to cotton. Some suitably located areas are in unimproved pasture. About 10 percent of this soil is in cutover native forest.

Bald areas, or those where shale is exposed, are seldom cultivated, though most of them support a few shrubs or other small vegetation. Many small areas of cropland are surrounded or partly surrounded by idle severely eroded areas of this soil or other soils.

This soil has poor workability. The optimum moisture range for tillage is narrow, and the soil will puddle if it is too wet or clod if too dry. The soil tends to be droughty, and a dry spell during the growing season will greatly reduce yields. The response to good management practices is only medium. Some improvement can be expected from erosion control and moisture conservation. The growing of deep-rooted crops will help break the firm subsoil and the underlying shaly material.

Most of this soil has been farmed under management that tended to increase erosion rather than control it. In recent years some landowners and operators are developing the rolling land into improved pasture consisting mainly of sericea lespedeza. Lespedeza is one of the best deep-rooted crops for pasture. It loosens the subsoil and adds organic matter to the soil.

STASER SERIES

The soil of the Staser series has a grayish-brown to reddish-gray very friable surface soil. It has formed from recent local alluvium and colluvium derived from uplands underlain by acid sandstone and calcareous rocks. Its parent material is similar to that of the Hamblen series, but the soils of the two series differ in drainage and in the color of their subsurface layer. The Staser soil is well drained and has a uniformly colored brown to reddish-brown subsurface layer. The Hamblen soil is somewhat poorly drained and has a mottled light yellowish-brown and light-gray subsurface layer.

The Staser soil is slightly acid to medium acid. It has a moderate content of organic matter and medium fertility. Permeability is moderately rapid, and the moisture-holding capacity is moderate to high. The soil of the Staser series has high productivity and a wide range of suitability.

Staser loam, local alluvium phase (0 to 5 percent slopes) (Sd).—This soil generally occupies narrow strips at the base of slopes that border soils of bottom lands. Some areas occur in depressions and some around drainage heads. In most places this soil consists of recent local alluvial and colluvial materials washed from sandy soils such as the Allen, Jefferson, and Tellico. In some places, however, it consists of sandy materials originating from watershed sandstone of the Pottsville and Red Mountain formations. Staser loam, local alluvium phase, is similar to Abernathy silt loam in mode of origin and to some extent in distribution and association. It has a sandier texture, however, especially in the surface soil, and usually is somewhat lighter colored. Areas of this soil are not as uniform in texture as Abernathy silt loam, because sandy material is not distributed so evenly over the surface by running water as finer materials.

Runoff is slow to medium. Internal drainage is medium. In some level or slightly depressional areas, ponding may occur during wet seasons unless the drainage is improved by installing open ditches or tile. Most areas of this inextensive soil are in Sand and Railroad Valleys, but some are in Dugout and Big Wills Valleys.

Profile description:

Surface soil—

0 to 8 inches, grayish-brown to reddish-gray very friable loam; weak fine crumb structure.

Subsurface—

8 to 18 inches, brown to reddish-brown friable loam grading with increasing depth to friable sandy clay loam or fine sandy clay loam.

Underlying material—

18 to 36 inches, grayish-brown, brown, reddish-brown, and yellowish-red, friable, somewhat stratified alluvium and colluvium consisting of sandy loam, silt loam, and sandy clay loam or silty clay loam.

The depth of this soil to bedrock is 5 feet or more. In places stratified material also makes up the subsurface layer. Some profiles have more development than the foregoing profile. The texture of this soil varies considerably from place to place, even in the same area. It ranges from heavy loam to light fine sandy loam.

As mapped, this soil includes areas of Neubert loam that are too small to be shown separately on the map. The included soil has a reddish-brown to dark reddish-brown friable loam surface soil about 15 inches thick and a reddish-brown to dark-red friable clay loam subsurface layer 21 inches, or more, thick. This inclusion is mostly near the base of the eastern ridge in Big Wills and Dugout Valleys. It is closely associated with the Tellico soils. It is fairly similar to Abernathy silt loam in workability and crop suitability.

Use and suitability (I–1).—More than 90 percent of Staser loam, local alluvium phase, is under cultivation or in improved permanent pasture. Corn is the chief crop. Other crops are soybeans for hay, alfalfa, sorghum, and leafy vegetables.

The soil is very easy to work and has excellent moisture-absorbing qualities. The sandier spots may be somewhat leached; in dry periods, they may be droughty. Some areas near the base of long slopes would benefit from terracing and stripcropping.

This soil is desirable for general farm crops, home gardens, sorghum, and potatoes. Its response to good management is very good.

STONY SMOOTH LAND, TALBOTT AND COLBERT SOIL MATERIALS

Stony smooth land, Talbott and Colbert soil materials (Sg).—This miscellaneous land type occurs in the limestone valleys and has a general slope range of 0 to 7 percent. It is characterized by outcrops of limestone bedrock and by large limestone boulders on the surface. Talbott and Colbert soil materials occupy the space between the rocks.

In places, particularly in parts of Big Wills Valley, many successive outcropping ledges of limestone almost make a belt of rock surface. These ledges are separated from other outcropping ledges or scattered limestone bedrock and boulders by well or moderately well-developed Talbott and Colbert soils or by Talbott-Colbert soil materials. Many of these stony areas have apparently been eroded, because the remaining materials resemble the lower subsoil or underlying material of the Talbott and Colbert soils.

Usually the areas under native forest have been affected very little by accelerated erosion, but normal or geologic erosion has been almost as fast as rock weathering and soil formation. As a result the accumulated soil material dominantly is very shallow to shallow. It has very little or no textural profile development.

In some areas the soil material is moderately deep to deep (25 to 60 inches), especially where it fills holes, cracks, and rock crevices. Its depth to bedrock in areas between outcropping ledges depends somewhat on the dip of the geologic formation, slope, and distance between the ledges. Where rock outcrops occur in irregular pattern, the depth varies considerably from place to place.

Runoff is medium, and internal drainage is usually slow because of the heavy soil materials and the shallow depth to bedrock. In the small areas having moderately deep to deep soil material, internal drainage is medium in the surface soil and the upper part of the underlying soil material. Drainage commonly is somewhat better in Talbott soil material than in Colbert soil material. Nearly solid stands of redcedar occur where the soil material is shallow; mixed hardwoods, redcedars, and pines occur where it is deeper.

This miscellaneous land type is medium to strongly acid. It is low in organic matter and has medium fertility. Permeability in the upper part of the soil is moderately slow, and in the lower part, very slow. The moisture-holding capacity is low.

Included are small areas of Rockland, limestone, steep. This inclusion has little value for pasture, but in most places it grows some redcedar suitable for fence posts.

Use and suitability (VIe–2).—More than half of the rather extensive area of Stony smooth land, Talbott and Colbert soil materials, is in forest that has been cut over from time to time. The rest has been cleared and is mostly in pasture, some of which has been improved (fig. 8). Other areas are being improved for pasture grasses. Very little of this land type is planted to row crops, but small areas are used for home gardens and occasionally for patches of corn, soybeans, and field peas.

FIGURE 8.—Stony smooth land, Talbott and Colbert soil materials, is too stony for cultivation but can be used for pasture.

Rock outcrops and rock fragments make the workability of this land type very poor in most areas. The erosion hazard is moderate. The response of this land type to good management is medium. Improved pasture should be fairly satisfactory, particularly where the soil material is deep and runoff is controlled.

STONY ROLLING LAND, TALBOTT AND COLBERT SOIL MATERIALS

Stony rolling land, Talbott and Colbert soil materials (Sf).—This land type differs from Stony smooth land, Talbott and Colbert soil materials, in having stronger slopes, more limestone outcrop, more limestone and chert fragments, and less soil material over bedrock. The general slope range is 7 to 15 percent.

A few small intricately associated areas have slopes of 15 to 25 percent. Except for milder relief, most of these inclusions differ very little from Rockland, limestone, steep. This miscellaneous land type is closely associated with Stony smooth land, Talbott and Colbert soil materials, on the more gentle slopes, and with Rockland, limestone, steep, near the stronger bluffs.

Runoff is rapid. Internal drainage is dominantly slow but is medium in the upper part of the soil in some areas. The natural cover is largely redcedar in some places and deciduous hardwoods mixed with scattered redcedars and a few pines in others. Redcedar is not so numerous as on Stony smooth land, Talbott and Colbert soil materials. The small acreage of Stony rolling land, Talbott and Colbert soil materials, occurs mainly near the base of the mountain bluffs in the limestone valleys.

This land type is medium to strongly acid. It is low in organic matter and medium in fertility. Permeability is moderately slow in the upper part of the soil and very slow in the lower part. The moisture-holding capacity is low.

Use and suitability (VIe–2).—Not more than 25 percent of this land type has been cleared, mostly for pasture. Very little of the cleared land has been improved. Pasture is fairly productive, and many native or common grazing plants reseed voluntarily and make good herbage.

Workability is very poor because of rock outcrops, loose limestone and chert fragments, and strong slopes. The erosion hazard is high. Very few areas should be cleared of forest. The more strongly rolling and stonier areas are best for forest, whereas the milder and less stony areas are satisfactory for semi-improved pasture, particularly if they are protected from excessive runoff. This land type responds moderately well to good management.

STONY COLLUVIAL LAND, STEEP

Stony colluvial land, steep (Se) occupies steep rough relief near the base of mountain bluffs and on slopes that descend from the brow of the sandstone plateaus to the valleys below. In a few places it occurs just below the sandstone escarpments near the tops of the bluffs. It developed on relatively deep colluvium composed of sandstone, shale, and limestone debris. The colluvial material was similar in color, texture, and consistence to that giving rise to the Allen soils, and in places to the Hermitage soils. This land type, however, has not developed normal profiles like those of the Allen soils because it is too steep and rough (25 + percent slopes). Small areas of Allen soils that have normal profiles and occupy smooth relief are included with this soil.

In general, soil material that makes up the surface and subsurface layers of the original or nearly uneroded soil of this land type weathered dominantly from sandstone. Large boulders and blocks of sandstone and pockets of partly weathered shale occur in the colluvium. Many large sandstone boulders and huge sandstone blocks protrude. The pockets of shale are observable only in deep gullies and road cuts.

This land type has rapid to very rapid runoff and medium internal drainage. It is slightly acid to strongly acid. It has a moderate supply of organic matter and medium fertility. Permeability is moderately rapid, and the moisture-holding capacity is moderate. The natural vegetation is mainly mixed deciduous hardwoods and pines.

Use and suitability (VIIe–2).—Practically all of this extensive land type is in native forest that has been cut over from time to time. It is not suited to crops, because of stoniness and rough steep slopes, and can be used best for forest. Lumbering is very difficult but is possible in nearly all places.

TALBOTT SERIES

The Talbott series consists of well-drained to excessively drained soils on undulating to hilly uplands in the limestone valleys. They have firm silty clay subsoils that are plastic when wet. Their parent material was derived largely from weathered products of argillaceous or clayey limestone and is similar to the parent material of the Colbert soils. The soils are modified in spots by materials weathered from shale, chert, cherty limestone, and sandstone. In places they receive a thin overwash of alluvium.

The native cover was largely of deciduous hardwoods that included practically all species native to this region. Scattered pines and redcedars grew in places.

The Talbott soils are associated mainly with Colbert, Dewey, Sequoia, Hermitage, and Muse soils, and with Stony smooth land, Talbott and Colbert soil materials, and Stony rolling land, Talbott and Colbert soil mateials. They are associated to a lesser extent with Etowah, Abernathy, and Huntington soils. They resemble Colbert soils in consistence, but usually their subsoils are not so firm nor so plastic when wet. They are similar to Dewey soils in color, but they generally have firmer subsoils that are more plastic when wet. The soils of the Talbott series have medium to low productivity and a wide to narrow range of suitability.

Talbott silty clay loam, eroded undulating phase (2 to 5 percent slopes) (Td).—This moderately well drained soil occurs on broad low divides in the limestone valleys. Erosion has removed nearly half to more than three-fourths of the surface layer and, in places, part of the subsoil. The present plow layer consists of subsoil material mixed with remnants of the original surface soil.

This soil has medium runoff and slow to medium internal drainage. It is medium to strongly acid and has a low content of organic matter. Fertility is medium. Permeability is moderately slow in the surface soil and slow in the subsoil. The moisture-holding capacity is moderate to low. Areas of this inextensive soil rarely exceed 10 acres in size. They are widely distributed throughout the limestone valleys, mostly in Big Wills Valley, the northern part of Dugout Valley, and the southeastern part of Little Wills Valley.

Profile description:

Surface soil—
0 to 5 inches (plow layer), reddish-brown to yellowish-red firm silty clay loam to silty clay; weak fine granular structure.

Subsoil—
5 to 25 inches, yellowish-red firm silty clay; reddish yellow when dry, plastic when wet; moderate medium subangular blocky structure.

Parent material—
25 to 37 inches, yellowish-red, firm, tough silty clay or clay splotched with shades of yellow and reddish yellow; reddish yellow when dry, and displays a moderate number of distinct to faint fine mottles of red and yellow; very plastic when wet.

In forested areas the surface soil is grayish-brown very friable silt loam in the upper part and yellowish-brown friable silty clay loam in the lower part. It is about 5 inches thick and is very pale brown when dry. The depth to bedrock is 2 to 6 feet. Some areas have an overwash of sandy alluvium ranging from a thin smear to a thickness of about 15 inches. Most areas are free from chert fragments, but some cherty areas are indicated on the soil map by symbol, especially those where the chert interferes with tillage. In areas that are deep to bedrock, the subsoil commonly is redder and more uniform in color, has stronger angular to subangular blocky structure, and is less sticky and plastic.

Use and suitability (IIIe–4).—Practically all of this soil is used each year for general farm crops, particularly corn and cotton. It is better suited to cotton than to corn, except in those areas where runoff has been controlled and organic matter has been added by planting winter legumes.

The soil is well suited to all minor crops grown in the area, especially if good soil management has been practiced. It is also well suited to winter legumes for grazing or for green-manure crops.

Workability is good. The hazard of further erosion is moderate. Even after heavy summer showers, the soil does not hold enough moisture to supply the moisture plants need. The soil makes medium response to good management and is desirable for agriculture.

Talbott silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Tc).—This somewhat excessively drained soil occupies stronger slopes and is somewhat more eroded than Talbott silty clay loam, eroded undulating phase.

This soil has rapid runoff and slow to medium internal drainage. It is medium to strongly acid, low in organic matter, and medium in fertility. The soil has moderately slow permeability in the plow layer and slow permeability in the subsoil. Its moisture-holding capacity is moderate to low. It occurs on uplands in the limestone valleys; on slopes near the base of Rockland, limestone, steep; and below exposures of interbedded limestone and shale, particularly in Dugout Valley. It is closely associated with other Talbott soils and with Colbert, Dewey, Sequoia, and Hermitage soils. Along some foot slopes it is associated with Allen soils.

The plow layer contains considerable clayey material brought up from the subsoil. It is reddish-brown to yellowish-red firm silty clay loam and is about 5 inches thick. The subsoil is yellowish-red firm silty clay, 18 to 20 inches thick. The depth to bedrock ranges from 1½ to 5 feet.

Included are about 100 acres of less eroded soil, mainly in forest. Also included are about 50 acres of cropland that is covered with a thin alluvial overwash; these areas contain waterworn gravel and small chert fragments in places.

Use and suitability (IVe–5).—Most of the fairly large acreage of Talbott silty clay loam, eroded rolling phase, has been planted to general farm crops, mainly row crops, for a number of years. Cotton and corn are the principal crops. Although cotton was chiefly grown, large areas are now being developed for improved pasture grown in rotation with corn and hay.

This soil makes medium response to good management. It has fair workability. The hazard of further erosion is high. It is difficult to convert the firm silty clay subsoil material into a good plow layer if the original surface soil is lost. Measures therefore should be taken to control erosion.

Under good management most areas, particularly those with gradients less than 8 percent, can be maintained as desirable cropland. Areas with slopes between 8 to 12 percent can be used for close-growing crops and for improved pasture. Pasture seeded to perennial grasses and legumes is particularly desirable. Sericea lespedeza is highly suitable for pasture.

Talbott silty clay, severely eroded rolling phase (5 to 12 percent slopes) (Tb).—This somewhat excessively drained soil is similar to Talbott silty clay loam, eroded rolling phase, in most profile characteristics. It is more severely eroded, however, and has a finer textured plow layer. Most areas have lost practically all, or all, of the original surface soil. In places part of the subsoil has been eroded.

This soil has rapid runoff and is highly susceptible to further erosion. Internal drainage is slow. The soil is medium to strongly acid, very low in organic matter, and low in fertility. Permeability is slow, and the moisture-holding capacity is low. As a result of rapid runoff, moisture absorption is low, especially moisture from heavy showers in summer.

Areas of this relatively inextensive soil are widely distributed. Several occur along the eastern border of Big Wills Valley and the eastern border of Little Wills Valley near Collinsville.

The present plow layer, a yellowish-red firm silty clay, is composed almost entirely of subsoil material. Although the slope range is 5 to 12 percent, the most common gradient is 8 to 12 percent. Deep gullies have developed in places and are indicated on the soil map by symbol. The depth to bedrock is 1 to 4 feet. A few bedrock outcrops and large boulders are present in places.

Use and suitability (IVe–5).—All of this soil has been used for crops for many years. Because of erosion, however, many areas are idle or in unimproved pasture. Some have reverted to forest. Reforestation is not commonly practiced, although some loblolly pine seedlings may have been planted. Less than half the acreage is used for crops and improved pasture. The soil is difficult to work and has low productivity. Response to good management practices is medium.

Talbott silty clay, severely eroded hilly phase (12 to 25 percent slopes) (Ta).—This excessively drained soil differs from Talbott silty clay, severely eroded rolling phase, chiefly in occupying somewhat stronger slopes and containing more bedrock outcrops and large boulders. Although the range in slope is 12 to 25 percent,

only a very few areas have gradients stronger than 16 percent.

Runoff is very rapid, and the hazard of further erosion is very high. Internal drainage is slow. This soil is medium to strongly acid, low in supply of organic matter, and low in fertility. It is slowly permeable and its moisture-holding capacity is low. This soil is associated with Rockland, limestone, steep, Stony rolling land, Talbott and Colbert soil materials, and with other soils on mountain bluffs and along the chert ridges.

The present plow layer consists almost entirely of subsoil material and is yellowish-red firm silty clay. The depth to bedrock ranges from 6 inches to 3 feet. Deep gullies have formed in places.

Use and suitability (VIe–3).—Nearly all the relatively small total area of this soil has been used for crops, but because of severe erosion, very little is now cropped. It is used principally for unimproved pasture. Some areas have returned to forest, mainly pines mixed with some hardwoods. Redcedars are fairly common along deep gullies, fences, and outcrops of limestone.

Severe erosion and hilly relief make this soil hard to work. Tilth and moisture absorption have been impaired by erosion, although some suitably located areas can be used for improved pasture. The response to good management is medium. Under present conditions the best use for this soil is for trees, particularly pine and redcedar.

TELLICO SERIES

The soils of the Tellico series are well drained to somewhat excessively drained and occur on ridges in the limestone valleys. They have dark-red friable subsoils. Their parent material consists of residual products derived mainly from calcareous sandstone and interbedded shale of the Red Mountain formation (Tellico sandstone formation). This formation underlies the Fort Payne chert, and its main exposures are on the northwestern slopes of the eastern ridge and the southeastern slopes of the western ridge. The formation is nearly continuous in the two ridges, but material sloughed from the Fort Payne chert has covered it in many places, particularly along the western ridge. Geologic erosion has removed material unevenly in other places, and the formation appears in a broken chain of exposures.

On the upper side of the eastern ridge, the Tellico soils are commonly associated with the Litz soils, and on the lower side they are associated with Rockland, limestone, steep. On the western ridge they are associated to some extent with the Fullerton, Litz, and Sequoia soils. The Tellico soils are extensive along the eastern ridge. They differ from the Litz soils in color and commonly in texture. They occupy hilly and steep ridge slopes, narrow to fairly wide rolling ridgetops, and scattered, small, benchlike positions.

Conservation of soil and moisture is fairly easy on undulating and gently rolling areas if started before the soils become severely eroded. Most areas that have been tilled, however, are made up of materials derived mainly from the subsoil. Any conservation practice set up now on soils of the Tellico series must deal with these badly eroded areas. Exceptions are a few sandy ridgetops.

The Tellico soils are medium to strongly acid. The supply of organic matter is generally low, and fertility is low to medium. The soils of this series have medium to low productivity and a medium to very narrow range of suitability.

Tellico loam, steep phase (25 to 45 percent slopes) (Th).—In general this soil is the most representative of the Tellico series in De Kalb County because it is largely in forest and has been changed very little by erosion. It is shallower to bedrock in most places than Tellico clay loam, eroded rolling phase. Although most areas of this soil are on steep slopes, some are on narrow ridgetops. Under forest the slopes are moderately smooth, but in places they have been deeply gullied.

Runoff is very rapid, and the erosion hazard is very high. Internal drainage is medium. The content of organic matter is medium and fertility is medium. Permeability is moderate to rapid in the surface soil and moderate to slow in the subsoil. The moisture-holding capacity is moderate.

The original forest cover was principally mixed hardwoods and scattered redcedars. The present woodland probably has more pine and redcedar than the original forest because the cutover areas reseed to pine and redcedar more rapidly than to hardwoods. In some small areas redcedars are practically the only trees.

Profile description:

Surface soil—
: 0 to 10 inches, dark reddish-brown to dark-brown friable loam; weak red when dry.

Subsoil—
: 10 to 18 inches, dark-red friable sandy clay; red when dry.

Parent material—
: 18 to 35 inches, red friable clay to heavy sandy clay; when dry, is reddish brown with yellow and reddish-yellow specks and streaks.

Bedrock underlies the soil at depths of 1 to 5 feet. Some areas have sandstone outcrops; these have many sandstone fragments less than 4 to more than 12 inches in diameter. Chert fragments are fairly common on the surface, particularly on the slopes of the western ridge. Many slopes are practically free from sandstone and chert fragments.

Use and suitability (VIIe–3).—Forest covers most of this fairly extensive soil and is its best use. Most areas have been cut over from time to time, although logging is difficult in places. Some areas are fenced and are used for woodland pasture (fig. 9).

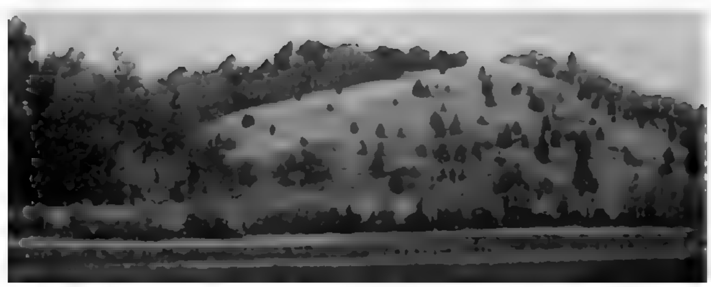

FIGURE 9.—Pasture on Tellico loam, steep phase, northeast of Fort Payne.

The soil has poor workability. A few of the most accessible areas, especially if they include nearly level ridgetops or benches, could be used for improved pasture. The response of this soil to good management is medium.

Tellico clay loam, eroded rolling phase (5 to 12 percent slopes) (Te).—This soil occurs on low knobs and on foot slopes, particularly on the southeastern boundary of Big Wills Valley, and on slopes bordering Dugout Valley on the northwest. It differs from the hilly and steep phases of the Tellico series in this county mainly in relief.

Runoff is rapid, and the soil is highly susceptible to further erosion. Internal drainage is medium. Soil fertility is medium; permeability is moderate to slow, and the moisture-holding capacity is moderate. The native vegetation was principally deciduous hardwoods, pines, and redcedars. Vines, briers, and brush formed the ground cover.

Profile description:

Surface soil—
- 0 to 5 inches (plow layer), dark reddish-brown or reddish-brown friable clay loam; weak red when dry.

Subsoil—
- 5 to 15 inches, dark-red friable sandy clay; red when dry.

Parent material—
- 15 to 33 inches, red friable clay to heavy sandy clay; reddish brown variegated with yellow and reddish-yellow specks and streaks when dry.

In forested areas where there is very little or no erosion, the surface soil is about 12 inches thick. The upper part consists of dark reddish-brown or reddish-brown loose to friable fine sandy loam; the lower part is a reddish-brown friable loam. The entire surface soil is weak red in color when dry. The parent material varies in composition according to its source. It was derived largely from fine-grained sandstone in some places, from sandstone interbedded with shale in others, and largely from shale in still others. Variations in texture are more distinct in the subsoil than on the surface. The entire surface has been covered with sandy materials weathered from higher lying sandstone outcrops or sandstone fragments. This sandy layer is soon lost when the land is cleared and used for crops or pasture.

Included with this soil, as mapped, are small acreages of other soils. The included soils are Tellico loam, eroded undulating phase (2 to 5 percent slopes), Tellico loam, rolling phase, mostly in native forest, and Tellico clay loam, severely eroded rolling phase, which has lost practically all the original surface layer and, in places, part of the subsoil through sheet and gully erosion.

Use and suitability (IVe–5).—About 60 percent of the relatively small acreage of this soil is used annually for crops and improved pasture, about 20 percent is in unimproved pasture or idle, and about 20 percent is in forest. Some severely eroded areas are returning to forest, mainly pine, through voluntary reseeding. Many tillable areas are bordered or partly surrounded by severely eroded or gullied land similar to that commonly associated with the Sequoia soil. Nearly all the tilled soil is used for row crops, chiefly cotton and corn.

Workability of this soil is fair. Erosion has impaired the tilth and moisture-absorbing qualities.

The response of this soil to good management practices, especially those that increase the supply of organic matter and control runoff and erosion, is medium. Most areas are fairly small and somewhat inaccessible. This soil has commonly been farmed without regard to the quantity of mineral fertilizers needed or to adequate control of runoff and erosion. Many of the desirable qualities that have been lost or reduced by erosion may be restored under better management.

This soil is suited to most of the general farm crops. It is not suited to row crops, particularly on the more strongly rolling areas. If these crops must be grown, cultivation should be on the contour. The soil is suited to a rotation of row crops and pasture, and to winter legumes used for grazing and for plowing under for green manure.

In De Kalb County little of this soil is planted to truck crops for market. In parts of Tennessee a similar soil is used commonly for garden vegetables because it warms early in spring and permits the crops to be planted and harvested earlier than on soils that warm more slowly. In recent years some fairly large areas in De Kalb County have been successfully developed into improved permanent pasture under soil-improvement programs.

Tellico clay loam, severely eroded hilly phase (12 to 25 percent slopes) (Tf).—This soil differs from Tellico clay loam, eroded rolling phase, chiefly in having stronger slopes and more severe erosion. It has lost nearly all, or all, of the surface soil and, in places, part of the subsoil. The present plow layer is mainly subsoil material, but in places it contains some of the original surface soil.

Runoff is very rapid, and the hazard of further erosion is high. Internal drainage is medium. Soil fertility is low, permeability is moderate to slow, and the moisture-holding capacity is low. The soil is closely associated with the other Tellico soils of the county.

The plow layer is a dark-red to dark reddish-brown friable clay loam. The subsoil is dark-red friable sandy clay about 6 inches thick. The texture of the plow layer ranges from friable heavy fine sandy loam to shaly clay.

Included with this soil, as mapped, is a small acreage of Tellico clay loam, eroded hilly phase. Also included is a small acreage of Tellico loam, hilly phase, which shows very little or no erosion.

Use and suitability (VIe–3).—All of this fairly extensive soil was once cultivated, but only a small part is now used annually for crops. Most areas are now in unimproved pasture or are idle. Many have returned to forest by voluntary reseeding, and a few may have been planted to loblolly pine. The small acreage used annually for general farm crops is planted mainly to corn and cotton.

This soil is difficult to work. Erosion has greatly impaired tilth and moisture absorption. The response to good management practices is medium. Crops are not well suited to this soil. Improved pasture and forest are the best uses. Sericea lespedeza is highly suitable for improved pasture. It can be seeded alone or seeded over with rescuegrass.

Tellico clay loam, severely eroded steep phase (25 to 45 percent slopes) (Tg).—This soil consists of areas that have been cleared and have lost practically all, or all, of the original loam surface soil and, in places, part of the subsoil. The plow layer is mostly subsoil material, although in some places it contains remnants of the original surface soil. The general slope range is 25 to 45 percent, but most slopes range from 25 to 30 percent.

This soil has very rapid runoff. The hazard of further erosion is very high. Internal drainage is medium.

The soil is low in fertility. It is moderately to slowly permeable and has a low water-holding capacity.

The plow layer is dark-red to dark reddish-brown friable clay loam, and the subsoil is dark-red friable sandy clay about 5 inches thick. The depth to bedrock ranges from ½ to 4 feet. The texture of the plow layer is predominantly clay loam, but it ranges from fine sandy loam through silty clay loam to silty clay.

Use and suitability (VIIe–3).—All areas of this inextensive soil have at some time been under cultivation or in pasture, but only a few are now used annually for crops. Cotton and corn are the chief crops. Some areas are in unimproved pasture. Many are idle and are voluntarily reseeding to pines, redcedars, and scattered hardwoods.

The steep slopes and, in places, sandstone or chert fragments make the workability of this soil very poor. Erosion has impaired the tilth. It has also increased runoff, and little of the rainfall is absorbed and retained by the soil. The soil will be difficult to restore to a good condition.

Very little of the soil is suited to row crops. Selected areas can be used for improved pasture of sericea lespedeza. Kudzu can be grown for periodic pasture. The response to good management is medium. Most areas should be left in forest.

TUPELO SERIES

The soil of the Tupelo series occurs on terrace lands. It has developed under a cover of water-tolerant deciduous hardwoods and is characterized by a mottled, very firm or tight subsoil. Its parent material consists of old mixed general alluvium derived from uplands underlain mainly by clayey (argillaceous) limestone. In places the alluvium is modified by materials from chert or sandstone.

The Tupelo soil is strongly acid. It has a low supply of organic matter and is low in fertility. The surface soil is moderately permeable, and the subsoil is slowly permeable. The moisture-holding capacity is moderate. The soil of this series has low to medium productivity and a medium range of suitability.

Tupelo silt loam (0 to 2 percent slopes) (Tk).—This somewhat poorly drained to poorly drained soil occurs on low stream terraces in limestone valleys. For the most part, the soil is level or nearly level, but near the margin of the terraces or near swales it has more pronounced slopes. It is closely associated with the Capshaw soil of the low stream terraces. Along the uplands, it adjoins the Colbert and Talbott soils and Stony smooth land and Stony rolling land, Talbott and Colbert soil materials.

Runoff and internal drainage are slow. A high water table usually is present in winter, early in spring, and in wet periods of other seasons. The natural vegetation is largely water-tolerant deciduous hardwoods, such as post and water oaks, sweetgum, blackgum, elm, hickory, persimmon, and dogwood. A few pines and redcedars are in the stand. In cutover forest, pines and redcedars are the most common trees. Nearly all of this inextensive soil is in the south-central and southern parts of Big Wills Valley.

Profile description:

Surface soil—

0 to 7 inches, dark-brown to brown or yellowish-brown friable heavy silt loam to silty clay loam; very pale brown when dry; plastic when wet, hard when dry.

Subsoil—

7 to 25 inches (claypan), reddish-yellow to brownish-yellow very firm or tight silty clay, mottled with shades of yellow, gray, and brown; mottles distinct, many, and of medium size; material sticky when wet.

Underlying material—

25 to 34 inches, dominantly gray, firm, stiff, tight clay or heavy silty clay, mottled with brown and light gray.

The depth of the soil to bedrock ranges from 3 to 7 feet. The color of the surface soil in the south-central part of Big Wills Valley is more brown than elsewhere. Small, round, soft to moderately hard concretions are very numerous in the soil in some places and nearly absent in others. The concretions are of buckshot size. Their distribution varies within short distances, although in some areas they are fairly uniformly scattered throughout the profile. In places the concretions occur near the surface; in others they are principally in the subsoil. Some angular chert fragments are in the underlying material in places.

As mapped, Tupelo silt loam includes a small acreage of Taft silt loam. This inclusion is similar to the Tupelo soil in positions occupied, color, and drainage, but it has a more friable subsoil.

Use and suitability (IIIs–1).—Most of Tupelo silt loam has been cleared and at some time used for row crops. Many areas are now in improved pasture.

Workability is good, if the soil is neither too wet nor too dry. Tilth is good to excellent. Under natural drainage, however, the soil dries too slowly in spring or after heavy rains to permit tillage operations. Moisture absorption is good, except where the surface soil has been washed away. The quantity of moisture absorbed depends on the depth of the friable surface soil, because moisture is absorbed slowly by the tight subsoil.

Most areas of this soil lie well above ordinary stream overflows, but many receive runoff from higher soils. The soil is fairly desirable for agriculture, however, especially where additional drainage can be established without too much time and labor. Surface water can be removed fairly well by open ditches. Shallow V-shaped ditches have proved very satisfactory and are easy to keep clean.

Drainage in most areas has been improved by roadside ditches, diversion ditches, and other changes that divert runoff from higher land. As a result, many crops that require good or moderately good drainage can be grown.

This soil is better suited to corn, soybeans, common lespedeza, and grain sorghums than to cotton. Cotton, however, is grown frequently on better drained areas. In general the soil is well suited to winter legumes if the runoff is adequate to remove water from the surface during wet periods in winter. It is very well suited to improved pasture and can be seeded to several mixtures of grasses and legumes. One suitable mixture consists of Ladino clover and Kentucky fescue. The response of this soil to good management is medium.

Use and Management of Soils

This section consists of two parts. The first explains how the soils of the county are placed in 25 capability units according to their relative suitability for farming and other uses. The second part gives estimated average acre yields that may be expected under ordinary management, and also under the best management the farmer could feasibly use on the soils of his farm.

Land-Capability Classification

The soils have been grouped to show their suitability for crops, grazing, forestry, and wildlife. This grouping is based on the uses that can be made of each soil, its management needs, and the risks of soil erosion or of other kinds of damage when the soil is used. This kind of grouping is called land-capability classification. Since it is a practical grouping based on needs and responses, it can bring together in one group the soils that were formed from different parent materials or in different ways. Soils that have similar management needs, risks of damage, and general capabilities make up a capability unit, which can also be called a management group of soils. In De Kalb County the soils have been grouped into 25 capability units.

Capability units are grouped into eight general land-capability classes, based on a rough summing up of their suitability for use, the risks of erosion or other damage, and the resulting degrees of management needs of the different soils. Within the eight general classes, subclasses identify dominant kinds of factors that require different kinds of management.

The eight general land-capability classes range from class I, which includes soils that are nearly level, productive, and not subject to erosion, to class VIII. Class VIII consists of soils and land types so rough, stony, wet, or otherwise limited that they produce little or no useful vegetation.

Classes I, II, and III are suitable for some of the crops ordinarily grown in the locality that require annual or at least periodic tillage. Management needs, or risks of damage, or both, are successively greater on soils in class II and class III than on those in class I. Soils in class IV are less suitable for a regular cropping system than those in the first three classes, but they can be used for tillage part of the time or with special precautions. In addition, soils in all four of these classes ordinarily are well suited to uses that require little or no cultivation, such as grazing, forestry, or wildlife. Management needs and probable yields can vary greatly on the different soils.

Soils not suitable for cultivation, or that require extreme management of any kind, including those subject to severe erosion if cultivated, are placed in classes V, VI, VII, or VIII. Class V, not used in this county, contains soils that are nearly level and not subject to erosion, but they are too wet, too frequently overflowed, or too stony for cultivation. Soils placed in class VI are more limited in one or more features than those in class IV, but they will supply some forage, orchard crops, or forest products. Some can be cultivated enough to prepare them for long-time forage, orchards, planted forests, or special perennial crops.

Soils in class VII are more limited than those in class VI. Generally they must be managed by harvesting the native cover or a partly controlled succession of plants. The choices in management are fewer, production is less, or risk of erosion is greater than on the soils in class VI.

Class VIII, not used in this county, consists of soils so severely limited that they produce little useful vegetation. They may provide attractive scenery or furnish shelter for wildlife. Some make up parts of watersheds in which runoff should be controlled.

SUBCLASSES: Each of the eight general classes contains soils that have limitations and management problems of about the same degree. The soils within a class may be of different kinds, however, and therefore the kinds of limitations are different. The dominant kind of limitation is indicated by one of four subclasses. The four subclasses indicate: Risk of erosion, if cover is not maintained, designated by the symbol (e); excess water either on or in the soil (w); shallow, droughty, or unusually infertile soil (s); or unusually hazardous climate (c). Usually not all of the subclasses will occur in an area the size of a county.

Land-capability units within each class and subclass are numbered consecutively, as IIe–1, IIe–2, and so on. Within class I there is usually no need to distinguish subclasses based on kinds of limiting factors, and units are distinguished by the class number and a numeral, such as I–1.

Capability classes, subclasses, and units that occur in De Kalb County are given in the following list. Next is a brief description of each of the capability units.

Class I.—Deep, well-drained, nearly level, productive soils. Suitable for intensive cultivation for a long time if good farming practices are followed.
- I–1: Well-drained friable loams and silt loams consisting of local alluvium.

Class II.—Soils that can be cultivated with only moderate risk of erosion or that have other moderate limitations.
- IIe: Gently sloping soils:
  - IIe–1: Undulating, well-drained, friable silt loams and silty clay loams on stream terraces and old colluvial slopes.
  - IIe–2: Gently sloping well-drained silt loams and cherty loams on colluvial slopes.
  - IIe–3: Undulating well-drained loams and fine sandy loams on sandstone.
- IIw: Soils slightly wet or subject to occasional overflow:
  - IIw–1: Loams and silt loams consisting of local and general alluvium.
  - IIw–2: Well-drained soils on flood plains, subject to occasional overflow.

Class III.—Soils that can be cultivated in a regular cropping system with moderately severe risks of erosion or that have other moderately severe limitations.
- IIIe: Rolling or undulating soils, subject to erosion:
  - IIIe–1: Rolling silty clay loams on high-grade limestone.
  - IIIe–2: Rolling silt loams and cherty silt loams chiefly on cherty limestone.
  - IIIe–3: Rolling fine sandy loams and loam on sandstone.
  - IIIe–4: Undulating, moderately well drained silty clay loam on clayey limestone.
  - IIIe–5: Undulating or rolling fine sandy loams and loams chiefly on sandstone or sandstone and shale.
- IIIw: Soils subject to high water table part of the time:
  - IIIw–1: Moderately well drained or somewhat poorly drained soils on colluvial slopes or stream terraces.
- IIIs: Soils with unfavorable soil texture:
  - IIIs–1: Somewhat poorly drained or mod-

erately well drained soils that have slowly permeable plastic subsoils.

Class IV.—Soils severely limited or subject to high risk of damage if used for tilled crops. They can be cultivated with special management.

- IVe: Strongly sloping (hilly) soils that are otherwise favorable for cultivation:
  - IVe–1: Hilly soils with medium internal drainage that are commonly deep over limestone.
  - IVe–2: Hilly soils with medium internal drainage that are deep over cherty limestone.
  - IVe–3: Rolling soils with excessive or somewhat excessive drainage, mostly shallow or very shallow over shale or sandstone.
  - IVe–4: Undulating or rolling stony or mucky soils.
  - IVe–5: Rolling eroded soils, mostly shallow to bedrock.
- IVw: Poorly drained soils that are difficult to manage for crops:
  - IVw–1: Poorly drained loams or clays; some are subject to overflow.

Class VI.—Soils not suitable for cultivation because of steep slopes or stoniness.

- VIe: Steep or stony soils:
  - VIe–1: Hilly and steep cherty soils.
  - VIe–2: Undulating or hilly stony soils.
  - VIe–3: Predominantly hilly soils, shallow or very shallow to bedrock.

Class VII.—Soils with serious hazards or limitations when used for pasture or woodland.

- VIIe: Severely eroded, rocky, or very shallow soils:
  - VIIe–1: Severely gullied land.
  - VIIe–2: Rocky and stony land types.
  - VIIe–3: Steep soils predominantly shallow or very shallow to shale bedrock.

Table 7 contains a list of the soils in each capability unit, with suggestions for suitable crops, cropping systems, and the main needs for management and conservation of each unit.

Capability unit I–1

In capability unit I–1 are well-drained friable loam and silt loam soils consisting of local alluvium. These soils are nearly level to gently sloping and are deep to bedrock. They are fertile and are medium to slightly acid. They have a large capacity for holding moisture available to plants and are permeable to roots to a depth of several feet. The soils of capability unit I–1 are subject to temporary ponding during periods of heavy rainfall but are not subject to flooding by streams. These soils are productive and are easily worked and conserved. They are suited to intensive cultivation and to many kinds of crops.

Capability unit IIe–1

Capability unit IIe–1 consists of undulating, well-drained, friable silt loam and silty clay loam soils developed on stream terraces and colluvial slopes. The soil material originated chiefly from high-grade limestone. The soils of this capability unit have moderately high fertility and are medium acid. They have a moderately large capacity for holding moisture available to plants and are permeable to roots to a depth of several feet. The more sloping parts are subject to erosion, and the plow layer in most places consists of a mixture of the original surface soil and subsoil materials.

These soils are productive, are easily worked, and require but moderate measures for their proper conservation. They are suited to intensive use and to practically all crops commonly grown in the county.

Capability unit IIe–2

Capability unit IIe–2 consists of gently sloping, well-drained silt loam and cherty silt loam soils on colluvial slopes. The soil material originated chiefly from cherty limestone and shale. Fertility is moderate and somewhat lower than that for the soils of IIe–1. The reaction is medium to strongly acid. The soils have a moderate capacity for holding moisture available to plants and are permeable to roots for several feet. Runoff is a moderate hazard on the more sloping parts, and some of the original surface soil has been lost through erosion. The cherty soil in this unit contains numerous fragments that interfere with cultivation.

The soils of capability unit IIe–2 are moderately productive and are easily worked except where quantities of chert are present. They require moderate measures for their proper conservation and are quite well suited to intensive use under good management. They are suited to practically all crops commonly grown in the county.

Capability unit IIe–3

Capability unit IIe–3 consists of undulating well-drained loam and fine sandy loam soils. The parent material of these soils originated chiefly from acid sandstone. The subsoils are more friable and more permeable than those of the soils of capability units IIe–1 and IIe–2. The soils of capability unit IIe–3 have low fertility and are medium to strongly acid. They have a moderate capacity for holding moisture available to plants and are very permeable to roots. Bedrock occurs at depths ranging from 2½ to 8 feet. Runoff is a moderate hazard on the stronger slopes. A large part of the original surface soil has been lost through erosion.

Although naturally low in fertility, these soils respond well to heavy fertilization. They are very easy to work and require moderate measures for their proper conservation. They are fairly well suited to intensive use under good management and to many kinds of crops.

Capability unit IIw–1

In capability unit IIw–1 are nearly level to gently sloping loam and silt loam soils consisting of local and general alluvium. These soils generally range from somewhat poorly drained to moderately well drained. A small area, however, is well drained. The Philo and Lindside soils are subject to flooding by streams; the other soils in the unit are temporarily ponded during periods of heavy rainfall. The fertility of the soils of this capability unit is low to moderate, and the reaction is medium to strongly acid. All of the soils have a large capacity for holding moisture available to plants and are permeable to roots to depths of 2 to 10 feet or more. Excess ground water is a moderate hazard in most of these soils. They hold enough moisture for pasture grasses and legumes, however, and are especially favorable for pasture during the drier parts of the grazing season.

TABLE 7.—*Suitable crops, suggested, cropping systems, fertilizer and tillage requirements, and supplementary water-control practices, by capability units, for soils of De Kalb County, Ala.*

Capability unit and soil	Suitable crops	Suggested cropping systems	Fertilizer requirements	Tillage requirements	Supplementary water-control practices	Remarks
I-1 Well-drained friable loams and silt loams consisting of local alluvium:						
Abernathy silt loam. Staser loam, local alluvium phase.	Corn, sorghum, cotton, soybeans, orchardgrass, fescue, Dallisgrass, Ladino clover and other whiteclovers, and annual lespedeza.	1. Row crops alternating with pasture. 2. Continuous row crops. 3. Continuous pasture.	Low, but many areas give noticeable response. Intensive cultivation will require additions of organic matter; lime deficiency not great.	Not exacting	Not exacting	Soils favored by good moisture relations, good tilth, deep root zone, and low slope gradient; much acreage subject to temporary ponding.
IIe-1 Undulating, well-drained, friable silt loams and silty clay loams on stream terraces and old colluvial slopes:						
Etowah silt loam, eroded undulating phase. Hermitage silty clay loam, eroded undulating phase.	Cotton, corn, small grain, soybeans (for seed), grain sorghum, and a wide variety of legumes (including alfalfa) and grasses for hay and pasture.	1. Cotton—winter legume, corn. 2. Row crop, small grain, and alfalfa or other legumes with grasses for hay or grazing.	Moderate to moderately high for all plant nutrients, lime, and organic matter; boron probably required for alfalfa.	Avoid tillage under wet conditions, especially on more eroded parts.	Cover crops to follow row crops; on stronger slopes, contour tillage and possibly terraces.	Responsive to good management practices and very productive; high productivity not difficult to maintain under high level of management.
IIe-2 Gently sloping well-drained silt loams and cherty loams on colluvial slopes:						
Minvale cherty silt loam, eroded undulating phase. Minvale silt loam, eroded undulating phase. Muse silt loam, eroded undulating phase.	Cotton, corn, small grain, grain sorghum, truck crops, and many legumes (including alfalfa), and grasses for hay and pasture.	1. Cotton—winter legume, corn. 2. Row crop, small grain, and alfalfa or other legumes with grasses for hay or grazing.	Moderately high for all plant nutrients, lime, and organic matter; boron probably required for alfalfa.	Avoid tillage under wet conditions, especially on more eroded parts.	Cover crops to follow row crops; on stronger slopes, contour tillage and possibly terraces.	Very good response can be expected from good management.
IIe-3 Undulating, well-drained loams and fine sandy loams on sandstone:						
Allen loam, eroded undulating phase. Hartsells fine sandy loam: Undulating phase. Eroded undulating phase. Jefferson loam, eroded undulating phase. Linker fine sandy loam, eroded undulating phase. Sequatchie fine sandy loam:	Cotton, corn, small grain, grain sorghum, truck crops, and many legumes (including alfalfa), and grasses for hay and pasture.	1. Cotton—winter legume, corn. 2. Row crop, small grain, and alfalfa or other legumes with grasses for hay or grazing.	High for all plant nutrients, lime, and organic matter; boron probably required for alfalfa.	Good tilth easily maintained; cultivation possible under a wide range of moisture content.	Cover crops to follow row crops; on stronger slopes, contour tillage and possibly terraces.	Soils very responsive, especially to adequate fertilization; may be somewhat less suited to some legumes and grasses than soils of capability unit IIe-1; they favor early planting and early maturing.

	Undulating phase. Eroded undulating phase.						
IIw–1	Loams and silt loams consisting of local and general alluvium: Cotaco-Barbourville loams. Greendale cherty silt loam. Hamblen loam, local alluvium phase. Lindside silt loam Ooltewah silt loam Philo loam	Corn, soybeans, sorghum, and some truck crops; certain legumes and grasses, especially whiteclovers and fescue, for pasture.	1. Continuous row crops. 2. Row crop followed by hay. 3. Continuous pasture.	Moderate to high for all plant nutrients and lime.	Good tilth easily maintained but tillage and other field operations restricted by periods of wetness.	Some of the soils have overflow hazard; much acreage of the unit can be improved for some crops by ditches or tile.	The abundant moisture supply favors very high yields of suited crops under heavy fertilization.
IIw–2	Well-drained soils on flood plains, subject to occasional overflow: Ennis silt loam Ennis cherty silt loam. Huntington silt loam Huntington fine sandy loam. Pope loam	Corn, soybeans, sorghum, and some truck crops; certain legumes and grasses, especially whiteclovers and fescue, for pasture.	1. Continuous row crops. 2. Row crop followed by hay. 3. Continuous pasture.	Low to moderate for all plant nutrients, lime, and organic matter, except for high lime requirement for Ennis and Pope soils.	Good tilth easily maintained but tillage and other field operations somewhat restricted by wetness.	Overflow hazard common; diversion levees may be practical in places.	Well suited to intensive use; easily maintained at a high level of productivity.
IIIe–1	Rolling silty clay loams on high-grade limestone: Dewey silty clay loam, eroded rolling phase. Hermitage silty clay loam: Eroded rolling phase. Severely eroded rolling phase.	Corn, cotton, small grain, sorghum, and most legumes (including alfalfa and sericea lespedeza) and grasses for hay and pasture.	1. Row crop followed by 2 to 4 years of sericea lespedeza, alfalfa, or grass-legume mixture for hay or pasture. 2. Row crop, small grain, and 2 to 4 years of hay or pasture.	Moderately high for all plant nutrients, lime, and organic matter; boron probably required for alfalfa.	Moderately heavy machinery required; moisture range for good tillage somewhat restricted; all cultivation on contour.	Runoff a decided hazard; close-growing cover crops are important in the rotation; contour cultivation and in places possibly terracing, subsoiling, and stripcropping may be practical for restraining runoff.	Soils noticeably responsive to good treatment but require careful management to maintain good tilth and restrain erosion losses.
IIIe–2	Rolling silt loams and cherty silt loams chiefly on cherty limestone: Clarksville cherty silt loam: Rolling phase Eroded rolling phase. Fullerton cherty silt loam: Rolling phase Eroded rolling phase. Minvale cherty silt loam: Rolling phase Eroded rolling phase. Minvale silt loam, eroded rolling phase. Muse silt loam, eroded rolling phase.	Corn, cotton, small grain, sorghum, and some legumes (including sericea lespedeza) and some grasses for hay and pasture.	1. Row crop followed by 2 to 4 years of sericea lespedeza or grass-legume mixture for hay or pasture.	High to very high for all plant nutrients, lime, and organic matter.	Good tilth not particularly difficult to maintain; chert interferes somewhat with field operations on the cherty soils; all cultivation on contour.	Runoff a decided hazard; close-growing cover crops are important in the rotation; contour cultivation and in places possibly terracing, subsoiling, and stripcropping may be practical for restraining runoff.	Soils suited to fairly wide use, but fertility is difficult to maintain at a high level.

TABLE 7.—*Suitable crops, suggested cropping systems, fertilizer and tillage requirements, and supplementary water-control practices, by capability units, for soils of De Kalb County, Ala.*—Continued

Capability unit and soil	Suitable crops	Suggested cropping systems	Fertilizer requirements	Tillage requirements	Supplementary water-control practices	Remarks
IIIe 3 Rolling fine sandy loams and loams on sandstone: Allen loam, eroded rolling phase. Hartsells fine sandy loam: Rolling phase Eroded rolling phase. Jefferson loam, eroded rolling phase. Linker fine sandy loam, eroded rolling phase.	Cotton, corn, small grain, grain sorghum, and a wide variety of legumes (including alfalfa) and grasses for hay and pasture.	1. Row crop followed by 2 to 4 years of sericea lespedeza or grass-legume mixture for hay or pasture.	High to very high for all plant nutrients, lime, and organic matter.	Good tilth easily maintained; all cultivation on contour; heavy tillage implements not ordinarily required; can be cultivated under a wide range of moisture content.	Runoff a decided hazard; close-growing cover an important part of the rotations; contour cultivation, and probably terracing and stripcropping are practical for restraining runoff in many places.	The soils respond greatly to heavy fertilization; they favor early planting and early maturing.
IIIe-4 Undulating moderately well drained silty clay loam on clayey limestone: Talbott silty clay loam, eroded undulating phase.	Corn, soybeans, cotton, and legumes and grasses for hay and pasture.	1. Row crop, small grain, and 2 to 3 years of legumes and grasses for hay and pasture.	Moderately high for all plant nutrients, lime, and organic matter; boron probably required for alfalfa.	Good tilth difficult to maintain; soil has narrow range of moisture content suitable for cultivation; heavy tillage implements required; contour cultivation on more sloping parts.	Runoff accumulates quickly and is a moderate hazard; maintenance of effective close-growing cover is among the most feasible measures for runoff control.	Shallow depth to clayey subsoil causes moderate droughtiness in most places.
IIIe-5 Undulating or rolling fine sandy loams and loams chiefly on sandstone or sandstone and shale: Apison loam: Undulating phase. Eroded undulating phase. Rolling phase Eroded rolling phase. Crossville loam: Undulating phase. Rolling phase Hartsells fine sandy loam: Undulating shallow phase. Eroded undulating shallow phase. Rolling shallow phase. Eroded rolling shallow phase.	Cotton, corn, soybeans, small grain, grain sorghum, and several legumes (including sericea lespedeza) and grasses for hay and pasture.	1. Row crop followed by 3 to 5 years of sericea lespedeza or other sod crops.	High for all plant nutrients, lime, and organic matter.	In most of the soils good tilth easily maintained, and cultivation feasible under a wide range of moisture content; contour cultivation; shallow depth interferes with terracing.	Runoff a decided hazard; close-growing cover and contour tillage are among the more feasible means for controlling runoff.	The shallow depth to bedrock limits the supply of available moisture and causes erosion to be a special hazard.

IIIw-1	Moderately well drained or somewhat poorly drained soils on colluvial slopes or stream terraces: Capshaw silt loam Johnsburg loam Leadvale silt loam: Eroded undulating phase. Eroded rolling phase. Pace cherty silt loam: Eroded undulating phase. Rolling phase Eroded rolling phase.	Corn, soybeans, small grain, cotton, and legumes (excluding alfalfa) and grasses for hay and pasture.	1. Row crop, small grain, and hay or pasture. 2. Row crop followed by 2 to 4 years of hay or pasture.	Moderately high for all plant nutrients, lime, and organic matter.	Good tilth not difficult to maintain; tillage and other field operations restricted somewhat by retarded removal of excess soil moisture; contour cultivation important on more sloping parts.	Terracing may be beneficial on the more sloping areas; ditch or tile drainage will improve much of the acreage for some crops.	The soils respond well to good management practices, especially fertilization, and the less sloping areas are not difficult to maintain in a productive state.
IIIs-1	Somewhat poorly drained or moderately well drained soils that have slowly permeable plastic subsoils: Colbert silty clay loam, eroded undulating phase. Tupelo silt loam	Soybeans, grain sorghum, corn, and several legumes and grasses for hay and pasture.	1. Row crop, small grain, and hay or pasture. 2. Row crop followed by 2 to 4 years of hay or pasture.	Moderately high for all plant nutrients, lime, and organic matter.	Good tilth difficult to maintain, especially for the Colbert soil; tillage operations notably limited by slow removal of excess water.	Some care required to restrain erosion on the Colbert soil; ditches may be beneficial for the Tupelo soil.	Moisture available to plants notably restricted by dry periods, especially on the Colbert soil.
IVe-1	Hilly soils with medium internal drainage that are commonly steep over limestone: Allen loam: Hilly phase Eroded hilly phase. Allen clay loam: Severely eroded rolling phase. Severely eroded hilly phase. Dewey silty clay loam, eroded hilly phase.	Grasses and legumes for hay and pasture, small grain, and corn.	1. Row crop, small grain, and several years of hay and pasture. 2. Pasture, and occasionally corn or a small grain. 3. Permanent pasture.	Moderately high for all plant nutrients, lime, and organic matter.	Practice a minimum of tillage; all field operations on the contour; good tilth difficult to maintain in the more eroded areas.	Runoff a very great hazard; diversion ditches and stripcropping may be beneficial.	The soils respond well to fertilization but they should be maintained under a close-growing cover as much of the time as possible.
IVe-2	Hilly soils with medium internal drainage that are deep over cherty limestone: Clarksville cherty silt loam: Hilly phase Eroded hilly phase. Fullerton cherty silt loam: Hilly phase Eroded hilly phase.	Grasses and legumes for hay and pasture, small grains, and corn.	1. Row crop, small grain, and several years of hay and pasture. 2. Pasture, and occasionally corn or a small grain. 3. Permanent pasture.	Fertilizer requirements very high for all plant nutrients, lime, and organic matter.	Practice a minimum of tillage; all field operations on the contour; good tilth not difficult to maintain but chert interferes materially with cultivation.	Runoff a great hazard; diversion ditches and stripcropping may be beneficial.	Heavier fertilization required and high-quality grazing vegetation more difficult to maintain than on soils of capability unit IVe-1.

TABLE 7.—*Suitable crops, suggested cropping systems, fertilizer and tillage requirements, and supplementary water-control practices, by capability units, for soils of De Kalb County, Ala.*—Continued

Capability unit and soil	Suitable crops	Suggested cropping systems	Fertilizer requirements	Tillage requirements	Supplementary water-control practices	Remarks
IVe-3 Rolling soils with excessive or somewhat excessive drainage, mostly shallow or very shallow over shale or sandstone: Litz silt loam, rolling phase. Muse silty clay loam, severely eroded rolling phase. Muskingum stony fine sandy loam, rolling phase.	Small grains, legumes and grasses for hay and pasture, corn, sorghum, and cotton.	1. Row crops, small grain, and several years of hay and pasture. 2. Pasture, and occasionally corn or a small grain. 3. Permanent pasture.	Fertilizer requirements very high for all plant nutrients, lime, and organic matter.	Cultivation should be restricted and on the contour; good tilth not difficult to maintain, except on the Muse soil.	Diversion ditches may be beneficial; terracing not practical because of shallow soil depth.	The very limited supply of available moisture greatly restricts yields; much acreage can best be used for permanent pasture.
IVe-4 Undulating or rolling stony or rocky soils: Allen stony loam, eroded rolling phase. Crossville rocky loam: Undulating phase. Rolling phase	Small grains, legumes and grasses for hay and pasture, corn, sorghum, and cotton.	1. Corn or sorghum, small grain, and 2 to 3 years of legumes and grasses for pasture.	Moderately high for all plant nutrients, lime, and organic matter.	Good tilth easily maintained; stones and rock interfere with cultivation that requires light implements; tillage should be on the contour.	Diversion ditches may be beneficial; terracing not practical because of stone, rock, and shallow soil depth.	Usefulness for cultivation greatly restricted by stone, rock outcrops, and shallow soil depth.
IVe-5 Rolling eroded soils, mostly shallow to bedrock: Colbert silty clay, eroded rolling phase. Sequoia silty clay, severely eroded rolling phase. Talbott silty clay loam, eroded rolling phase. Talbott silty clay, severely eroded rolling phase. Tellico clay loam, eroded rolling phase.	Small grains, legumes and grasses for hay and pasture, corn, sorghum, and cotton.	Chiefly sod crops, including sericea lespedeza; row crops once in 4 to 7 years.	High for all plant nutrients, lime, and organic matter.	Much power required for tillage; good tilth difficult to maintain; all cultivation on contour.	Diversion ditches may be beneficial; terracing generally not practical.	Usefulness for cultivation greatly restricted by poor tilth, low capacity for available water, general shallowness to bedrock, and strong slope.
IVw-1 Poorly drained loams or clays; some are subject to overflow: Atkins silt loam Dowellton silty clay loam. Dunning silty clay Lickdale loam Melvin silt loam Robertsville silt loam.	Legumes and grasses for permanent pasture; when drained, corn, sorghum, soybeans, and certain legumes and grasses, as lespedeza and fescue, for hay.	Permanent pasture; when drained, continuous row crops or short rotations.	High for all plant nutrients, lime, and organic matter.	Cultivation delayed by prolonged wetness; the Dunning and Dowellton soils especially difficult to till.	Artificial drainage; such drainage not practical for the Dowellton soil, however.	Poor drainage restricts the range of suitability and productivity.

VIe–1 Hilly and steep cherty soils: Clarksville cherty silt loam, steep phase. Clarksville cherty silty clay loam, severely eroded steep phase. Fullerton cherty silty clay loam, severely eroded hilly phase.	Forest; permanent pasture on the more favorable sites.	Continuous forest or pasture.	Very high for all plant nutrients for permanent pasture.	Tillage very difficult and impractical.	Maintain effective vegetative cover.	Strong slopes make cultivation impractical.
VIe–2 Undulating or hilly stony soils: Allen stony loam, hilly phase. Allen stony clay loam, severely eroded hilly phase. Stony smooth land, Talbott and Colbert soil materials. Stony rolling land, Talbott and Colbert soil materials.	Legumes and grasses for pasture; forest.	Permanent pasture or forest.	High for all plant nutrients for permanent pasture on suitable areas.	Not suitable for tillage.	Maintain effective vegetative cover.	Some areas of the stony land types too stony or shallow for pasture.
VIe–3 Predominantly hilly soils, shallow or very shallow to bedrock: Litz silt loam, hilly phase. Litz shaly silty clay loam: Eroded rolling phase. Eroded hilly phase. Muskingum fine sandy loam: Hilly phase Eroded hilly phase. Muskingum stony fine sandy loam, hilly phase. Pottsville loam, hilly phase. Pottsville shaly loam, eroded hilly phase. Talbott silty clay, severely eroded hilly phase. Tellico clay loam, severely eroded hilly phase.	Forest; pasture on the more favorable sites.	Forest or permanent pasture.	For pasture, high for all plant nutrients.	Very exacting because of strong slope and shallow depth.	Maintain effective vegetative cover.	Much of the acreage can best be used for forest.
VIIe–1 Severely gullied land: Gullied land	Forest or other hardy permanent vegetation.	Forest or other hardy permanent vegetation.	Impractical	Impractical except in areas that can be worked with heavy machinery.	Diversion ditches in places.	Smoothing for cultivation of some areas may be feasible though very expensive.

TABLE 7.—*Suitable crops, suggested cropping systems, fertilizer and tillage requirements, and supplementary water-control practices, by capability units, for soils of De Kalb County, Ala.*—Continued

Capability unit and soil	Suitable crops	Suggested cropping systems	Fertilizer requirements	Tillage requirements	Supplementary water-control practices	Remarks
VIIe-2 Rocky and stony land types: Rockland limestone, steep. Rockland, sandstone, steep. Rockland, sandstone, rolling. Stony colluvial land, steep.	Forest	Forest	Impractical	Impractical	None	Low productivity even for forest.
VIIe 3 Steep soils predominantly shallow or very shallow to shale bedrock: Litz silt loam, steep phase. Litz shaly silty clay loam, eroded steep phase. Tellico loam, steep phase. Tellico clay loam, severely eroded steep phase.	Forest, chiefly pine	Forest	Impractical	None	Diversion ditches in places.	The most favorable sites can be used for pasture under careful management.

The soils of this capability unit are productive and are easily worked. Cultivation, however, is commonly retarded because they dry slowly. These soils are easily conserved and are suited to intensive cultivation. Not all the crops of the area can be grown on them, however.

Capability unit IIw–2

Capability unit IIw–2 consists of nearly level well-drained soils on first bottoms. They range in texture from fine sandy loam to silt loam, but the quantity of chert in one of the Ennis soils interferes with tillage. They have moderate to high fertility and range from strongly to slightly acid. The soils of this unit have a moderate to high capacity for holding moisture available to plants and are permeable to roots to a depth of several feet. Practically all of the acreage is subject to overflow, and scouring may be a hazard in places.

These soils are productive and easily worked and conserved. They are suited to intensive use, but not all crops of the area can be grown, because of the danger from floods.

Capability unit IIIe–1

Capability unit IIIe–1 consists of rolling, well-drained, silty clay loam soils. The parent material originated chiefly from high-grade limestone. These soils are deep to bedrock. Their fertility is moderately high, and their reaction is medium to strongly acid. Much of the original surface soil, and in places all of it, has been lost through erosion. As a result the plow layer has become more clayey and the tilth and moisture relations are less favorable. The subsoil, though a firm silty clay loam to silty clay, is permeable to roots. The moisture-holding capacity of these soils ranges from moderate to low, according to the amount of surface soil material lost by erosion.

The soils of this unit are particularly subject to erosion. The more eroded parts are droughty and have decidedly unfavorable tilth. These soils are productive under good management, but they are a little more difficult to work and conserve than soils of group IIe–1. They are suited to moderately intensive use and to many kinds of crops.

Capability unit IIIe–2

Capability unit IIIe–2 consists of rolling, well-drained, silt loam and cherty silt loam soils. The parent material of all, except for the Muse soil, originated from cherty limestone. All of the soils are deep to bedrock. Their fertility is generally low, and their reaction is medium to strongly acid. Most of these soils have chert fragments in the plow layer that interfere with cultivation, and some have lost a large amount of the original surface soil through erosion. The plow layers, however, have fairly good tilth. The soils of this capability unit are permeable to roots and have moderate capacity for holding moisture available to plants. Erosion is a hazard to all soils in the unit.

These soils are moderate to low in productivity and are a little more difficult to work than soils of capability unit IIe–1. Under good management they are suited to moderately intensive use and to many different crops.

Capability unit IIIe–3

Capability unit IIIe–3 consists of rolling well-drained fine sandy loam and loam soils. The parent material of these soils originated chiefly from acid sandstone. Depth to bedrock is moderate to deep. Fertility is generally low, and the reaction is medium to strongly acid. The moisture available to plants is moderate. The soils of this capability unit have predominantly sandy clay loam subsoils that are very permeable to roots. Although these soils have somewhat less depth to bedrock than soils of capability units IIIe–1 and IIIe–2, they have comparatively good moisture relations because of their greater permeability to roots. Erosion is a hazard to all of these soils.

These soils are moderate to low in productivity. Their sandiness makes them easy to cultivate, but their moderately strong slope hinders field operations and causes problems in conservation. These soils are suited to many kinds of crops.

Capability unit IIIe–4

Capability unit IIIe–4 includes an undulating moderately well drained silty clay loam soil. The parent material of this soil originated from clayey limestone. The depth to bedrock is moderate in most places but is shallow in some. A few rock outcrops occur. The soil of this capability unit has moderate fertility and is medium to strongly acid. Its tilth is fairly good, except where erosion has exposed the clayey subsoil. In these eroded areas, tilth is poor and the soil becomes hard when dry. In all places the subsoil is plastic clay and is slowly permeable to roots and water. The capacity for holding moisture available to plants is moderate in the soil of this unit. It is lower than for soils of units IIe–1 and IIIe–1. The more eroded patches are droughty. Erosion is a hazard, especially on the more sloping areas.

The soil of this capability unit is moderately productive. It is difficult to work and presents some conservation problems. It is suitable for moderately intensive use. The crops to which it is well suited are somewhat restricted.

Capability unit IIIe–5

Capability unit IIIe–5 consists of undulating and rolling well-drained fine sandy loam and loam soils. The parent material of these soils originated chiefly from acid sandstone and sandstone interbedded with shale. The depth to bedrock ranges from shallow to moderately deep. Fertility is low, and the reaction is medium to strongly acid. The plow layer has good tilth; it is friable and very permeable to roots. The capacity of these soils for holding moisture available to plants is low to moderate. Because the more sloping parts are subject to erosion and are generally shallow to bedrock, all of the soils are easily damaged by losses of soil material.

The soils of this unit are low in productivity. Because of their general shallowness and moderately strong slopes, they are not easy to work and conserve. They are not suited to intensive use. The number of crops well suited to them is somewhat limited.

Capability unit IIIw–1

Capability unit IIIw–1 consists of undulating and rolling, moderately well drained to somewhat poorly drained silt loam and cherty silt loam soils that developed on old colluvium and stream terraces. The depth to bedrock ranges from moderately deep to deep. Fertility is low to moderate, and the reaction is medium to strongly acid. Tilth is good in the plow layer, except in the Pace soils, which contain enough chert to interfere with cultivation. The impaired drainage and a pan condition at about 28 inches in much of the Pace soils interfere with deep root development.

The soils of this capability unit are moderately productive under good management. Retarded drainage delays tillage at times, and the chert in some of the soils hinders field operations. These soils are easily conserved against erosion losses, except on the stronger slopes. They are suited to moderately intensive use but not to a wide variety of crops.

Capability unit IIIs–1

Capability unit IIIs–1 consists of nearly level and undulating somewhat poorly drained to moderately well drained soils. These soils have slowly permeable clayey subsoils and are commonly underlain by limestone bedrock at 3½ feet or less. They are medium to strongly acid. The supply of organic matter and level of fertility are medium to low. The response to fertilization is moderate. The plastic clayey material of the subsoil restricts the root zone and the amount of moisture available to plants, especially in the Colbert soils. The slow permeability, however, causes inadequate drainage during the wettest periods, and spring planting is delayed. Erosion is not a great hazard, except on the more sloping parts of the Colbert soils. The more nearly level areas could be improved by artificial surface drainage.

These soils are restricted in range of suitable crops and in response to fertilizer by their impaired drainage and slowly permeable subsoils. These unfavorable characteristics also restrict their suitability for intensive cropping.

Capability unit IVe–1

Capability unit IVe–1 consists of hilly soils with medium internal drainage. These soils are commonly deep to limestone bedrock and have red sandy clay loam to silty clay loam subsoils. They are medium to strongly acid, moderate to very low in organic matter, and generally medium to low in fertility. They are permeable to a depth of several feet, and, except for the severely eroded soils, they have a moderate capacity for holding moisture available to crops. Response to fertilization is medium to great. The erosion hazard is high under cultivation, especially on the severely eroded parts.

Chiefly because of their strong slopes, the soils in capability unit IVe–1 are not suited to intensive cultivation. Much of their acreage therefore should be in close-growing crops and pasture.

Capability unit IVe–2

Capability unit IVe–2 consists of hilly soils with medium internal drainage. These soils have yellow to yellowish-red cherty silty clay subsoils and are very deep to cherty limestone bedrock. They are medium to strongly acid and low in supply of organic matter and plant nutrients. They are permeable to a depth of several feet and have a moderate to low capacity for holding moisture available to plants. These soils respond well to good management. They require large applications of fertilizer for good yields. Because of the strong slopes of these soils, the erosion hazard is high in cultivated areas and field operations are difficult. Consequently, they should be used chiefly for close-growing crops and pasture.

Capability unit IVe–3

Capability unit IVe–3 consists of rolling soils with excessive to somewhat excessive drainage. Most of their acreage is very shallow or shallow to shale or sandstone bedrock. The soils in this capability unit range in texture from fine sandy loam to silty clay loam. All of the soils are medium to strongly acid and low in supply of organic matter and fertility. The shallow depth to bedrock greatly restricts the root zone and the capacity for holding moisture available to plants.

Because the soils of this unit are shallow, losses caused by erosion seriously lower their productivity. The response of these soils to good management is medium, largely because of their shallowness. Most of the acreage should be in grass or trees.

Capability unit IVe–4

Capability unit IVe–4 consists of undulating to rolling well-drained loamy soils that contain stones or rocks that interfere with cultivation. Much of the acreage is shallow to bedrock. All of these soils are medium to strongly acid and low to medium in content of organic matter and fertility. They respond well to fertilizers. However, the abundance of stone and the shallowness to bedrock limit their capacity for holding moisture available to plants and interfere with field operations, especially tillage. Except where hand tillage and small implements can be used, most of the acreage probably is best used for pasture or trees. The soils are suited to most field and truck crops commonly grown in the county, if field operations can be conducted.

Capability unit IVe–5

Capability unit IVe–5 consists of rolling, moderately well drained to somewhat excessively drained soils. These soils have lost much, or all, of the original surface soil through erosion, and as a result they have predominantly firm clay loam to silty clay plow layers. Most of the acreage is shallow to bedrock. The subsoils, except in the Tellico soil, are firm to very firm silty clay. The fertility of the soils of this unit is predominantly low. The reaction is medium acid to strongly acid, and the content of organic matter is low to very low. All of these soils are very droughty, as the capacity

for holding moisture available to plants is generally low, both in the plow layer and in the subsoil. The response to good management is medium. The soils of this unit, however, are not suited to intensive use, and the crops well suited to them are limited. Much of the acreage should be in permanent pasture or forest.

Capability unit IVw–1

Capability unit IVw–1 consists of poorly drained soils. These soils are nearly level, and their plow layers have loamy to clayey textures. They range rather widely in reaction, content of organic matter, and fertility. The Melvin, Dunning, and Atkins soils are commonly subject to overflow, and the Robertsville and Lickdale have perched water tables. The Dowellton soil occupies smooth upland positions, and its poor drainage is caused chiefly by very slow runoff and permeability.

These soils are restricted in use for crops mainly by excess moisture. The feasibility of improving their drainage varies greatly. Artificial drainage is probably feasible for some areas of the Robertsville, Atkins, and Melvin soils, but little can be done to improve the drainage of the Dowellton soil. Permanent pasture or forest is the best use for areas that cannot be artificially drained.

Capability unit VIe–1

Capability unit VIe–1 consists of hilly and steep cherty soils not suited to cultivation. The hilly and some of the steep areas are severely eroded and consequently have a cherty silty clay loam plow layer. All of the soils are very deep to bedrock and contain loose stones that interfere with cultivation. All are medium to strongly acid, and low to very low in organic matter and fertility. Runoff is rapid to very rapid. Because of the strong slopes the erosion hazard on cultivated areas is high to very high. Under careful management, including proper seeding and fertilization, much of the acreage will support good pasture.

Capability unit VIe–2

Capability unit VIe–2 consists of undulating to hilly soils that are so stony that cultivation is impractical. These soils generally have enough soil material to support adequate pasture vegetation if good management is practiced. All except the Allen soils have restricted moisture. Erosion is a hazard on most of the acreage. The Talbott and Colbert soil materials are clayey and shallow to bedrock, and their grazing capacity is therefore limited. Much of the acreage of soils in this group probably is best for forest. Cedar appears to be one of the better trees for the Talbott and Colbert soil materials. The Allen soils, especially in the less eroded areas, are well suited to pines and various hardwoods.

Capability unit VIe–3

Capability unit VIe–3 consists of predominantly hilly soils that are shallow to very shallow to bedrock. All but the Talbott soils have friable surface and subsurface layers and are underlain by sandstone or shale. All are low to very low in fertility and have a low capacity for holding moisture available to plants. Under careful management they will produce pasture with a moderate carrying capacity. The best use for most of the acreage, however, is for forest.

Capability unit VIIe–1

Capability unit VIIe–1 includes areas that consist largely of an intricate pattern of gullies too deep to be crossed easily by ordinary farm machinery. The areas are low in fertility and have a low capacity for holding moisture available to plants. Their restoration for cultivation or pasture would require much effort and expense. Most areas can be handled best by establishing kudzu or other hardy close-growing crops or by planting pines.

Capability unit VIIe–2

Capability unit VIIe–2 consists of land types that are very largely of rock and stone. They have little soil material. These land types have little or no value for crops or pasture and a low value for trees.

Capability unit VIIe–3

Capability unit VII–3 consists of steep soils predominantly shallow or very shallow to shale bedrock. These soils are all low to medium in fertility. In most areas, they have a low to very low capacity for holding moisture available to plants. The steep slope and shallow depth make them poorly suited, even for pasture, although some of the more favorable sites may be used for grazing under careful management. Much of the acreage will produce trees and should be used for forest.

Estimated Yields

Estimated average acre yields of principal crops are given in table 8 for each soil of the county. In columns A are listed yields to be expected over a period of years under the management now prevailing on most farms. In columns B are given the yields to be expected under improved management.

The yields given in columns A are based largely on observations made by members of the soil survey party, on information obtained by interviews with farmers and other agricultural workers who have had experience with the soils and crops of the area, and on comparisons with yields on similar soils in other counties in Alabama. Data giving specific crop yields by soil types are not generally available, but the yields given in columns A are based on a summation of local experience. They are considered fairly reliable predictions of the yields that may be expected under the management.

TABLE 8.— *Estimated average acre yields of principal crops under two levels of management*

[Yields in columns A are those to be expected under prevailing management practices; those in columns B are to be expected under improved management practices. Absence of a yield figure indicates crop is very poorly suited at the management level indicated]

Soil	Capability unit	Corn A	Corn B	Wheat A	Wheat B	Hay: Alfalfa A	Hay: Alfalfa B	Hay: Soybean A	Hay: Soybean B	Hay: Lespedeza A	Hay: Lespedeza B	Potatoes A	Potatoes B	Cotton (lint) A	Cotton (lint) B	Pasture A	Pasture B
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Abernathy silt loam	I-1	40	80	[2] 12	[2] 20	[2] 3.1	[2] 4.0	2.2	3.5	1.3	1.8	150	190	350	500	[3] 160	[3] 240
Allen loam:																	
Eroded undulating phase	IIe-3	25	50	16	23	2.1	3.2	1.9	3.2	.8	1.4	100	180	360	580	80	160
Eroded rolling phase	IIIe-3	23	48	[4] 15	[4] 20	2.0	3.1	1.7	2.8	.5	1.3	75	110	310	500	70	150
Hilly phase	IVe-1	12	35		18			1.5	2.5	.5	1.2		100	200	380	45	120
Eroded hilly phase	IVe-1	10	30		18			.8	2.3	.4	1.1		75	180	360	40	110
Allen stony loam:																	
Eroded rolling phase	IVe-4	17	30						1.2	.3	1.0				380	35	100
Hilly phase	VIe-2	15	28						2.0	.4	.9		50		320	25	75
Allen clay loam:																	
Severely eroded rolling phase [5]	IVe-1	10	30		[4] 18		2.7	.7	2.0	.4	1.0		100	160	380	40	110
Severely eroded hilly phase [5]	IVe-1	8	25		14			.5	1.8	.3	.8		65		320	35	100
Allen stony clay loam, severely eroded hilly phase [5]	VIe-2								1.0	.2	.5					20	65
Apison loam:																	
Undulating phase	IIIe-5	34	65	16	24	1.8	2.4	1.8	3.0	.7	1.3	90	170	350	550	80	175
Eroded undulating phase	IIIe-5	32	60	12	22	1.6	2.2	1.8	2.8	.5	1.1	80	140	325	525	75	170
Rolling phase	IIIe-5	30	52	[4] 10	[4] 22	1.6	2.0	1.6	2.5	.5	1.2	70	125	300	500	70	160
Eroded rolling phase	IIIe-5	25	40	[4] 8	[4] 20	1.4	1.8	1.4	2.2	.2	.8	65	120	275	450	55	140
Atkins silt loam [6]	IVw-1	30	45		20			1.9	3.0	.9	1.7		120			100	200
Capshaw silt loam	IIIw-1	28	55	14	20			2.0	3.2	.8	1.7	80	120	200	500	100	195
Clarksville cherty silt loam:																	
Rolling phase	IIIe-2	12	32	[4] 8	[4] 18		1.5	1.5	2.5	.7	1.5	60	100	200	475	40	90
Eroded rolling phase	IIIe-2	10	30	[4] 7	[4] 15		1.5	1.4	2.3	.6	1.4	60	100	190	450	35	80
Hilly phase	IVe-2	8	25					1.0	2.0	.5	1.1	50	90	190	400	30	70
Eroded hilly phase	IVe-2	8	25					1.0	2.0	.4	1.0	40	80	180	375	30	65
Steep phase	VIe-1	7	20							.4	1.0			180	250		
Clarksville cherty silty clay loam, severely eroded steep phase [5]	VIe-1		20							.3	.8			135	200		
Colbert silty clay loam, eroded undulating phase	IIIs-1	14	32	9	18	1.2	2.4	1.5	2.6	.5	1.0			160	350	60	120
Colbert silty clay, eroded rolling phase	IVe-5	10	25	7	14		2.2	1.5	2.0	.4	.9			140	300	40	100
Cotaco-Barbourville loams [6]	IIw-1	35	65	14	25			1.7	3.0	.9	1.6	100	200	350	550	50	170
Crossville loam:																	
Undulating phase	IIIe-5	30	65	15	28			2.0	3.0	.8	1.6	120	200	300	500	120	180
Rolling phase	IIIe-5	20	50	[4] 12	[4] 24			1.5	2.6	.6	1.2	50	150	200	500	75	140
Crossville rocky loam:																	
Undulating phase	IVe-4		35						2.0	.5	1.0					50	125
Rolling phase	IVe-4									.4	.8					30	70
Dewey silty clay loam:																	
Eroded rolling phase	IIIe-1	28	50	15	22	2.4	3.2	1.8	2.9	.8	1.6	80	120	350	550	70	170
Eroded hilly phase	IVe-1	10	30					1.0	2.0	.4	.9			200	400	50	140
Dowellton silty clay loam	IVw-1	18	38	12	22			2.0	3.0	.6	1.2			160	375	75	145
Dunning silty clay [6]	IVw-1	15	40					1.7	3.0	.7	1.5					120	200
Ennis silt loam	IIw-2	35	65	16	23	2.5	3.8	2.0	3.4	1.0	1.8	90	140	300	500	130	210
Ennis cherty silt loam	IIw-2	25	50					1.7	2.8	.9	1.7			250	400	125	200
Etowah silt loam, eroded undulating phase	IIe-1	30	65	18	25	2.8	3.8	2.0	3.1	1.0	1.8	100	200	250	600	[3] 100	[3] 200
Fullerton cherty silt loam:																	
Rolling phase	IIIe-2	20	42	[4] 14	[4] 19		2.8	1.5	2.5	.5	1.3	65	110	300	500	65	1[illegible]5
Eroded rolling phase	IIIe-2	20	40	[4] 13	[4] 18		2.8	1.5	2.4	.5	1.2	65	110	290	490	60	140
Hilly phase	IVe-2	12	32					1.1	2.0	.3	.9		75	220	400	50	130
Eroded hilly phase	IVe-2	10	30					1.0	2.0	.3	.7		75	200	400	30	115

Fullerton cherty silty clay loam, severely eroded hilly phase [5]	VIe-1				---	---	---	---	1.8	.2	.6	---	---			25	110
Greendale cherty silt loam	IIw-1	27	60	12	23	2.7	3.6	2.0	2.8	.9	1.7	85	135	270	490	100	200
Gullied land [5]	VIIe-1	---	30	---	18	---		---	1.8	.2	.7			---	330	20	135
Hamblen loam, local alluvium phase [6]	IIw-1	30	60	---	20	---		2.3	3.1	1.2	1.8	110	180	---	480	25	190
Hartsells fine sandy loam:																	
Undulating phase	IIe-3	30	60	15	22	2.5	3.5	2.0	3.0	.8	1.5	125	200	450	625	70	150
Eroded undulating phase	IIe-3	28	60	15	22	2.5	3.5	2.0	3.0	.8	1.5	125	200	435	625	68	150
Rolling phase	IIIe-3	25	50	[4] 12	[4] 20	2.0	2.9	1.8	2.3	.7	1.3	100	180	380	560	65	140
Eroded rolling phase	IIIe-3	24	48	[4] 12	[4] 20	[7] 1.8	[7] 2.8	1.7	2.7	.7	1.2	100	180	330	550	60	135
Undulating shallow phase	IIIe-5	23	46	11	18	---	---	1.4	2.3	.7	1.2	100	170	360	500	65	135
Eroded undulating shallow phase	IIIe-5	22	45	10	17	---	---	1.4	2.3	.6	1.1	100	170	350	490	60	130
Rolling shallow phase	IIIe-5	20	42	[4] 9	[4] 16	---	---	1.1	1.9	.5	1.0	---	---	325	420	50	130
Eroded rolling shallow phase	IIIe-5	18	40	[4] 9	[4] 16	---	---	1.0	1.6	.5	1.0	---	---	310	400	50	130
Hermitage silty clay loam:																	
Eroded undulating phase	IIe-1	30	58	18	25	2.6	3.5	1.9	2.9	.9	1.6	100	200	400	560	95	195
Eroded rolling phase	IIIe-1	30	55	[4] 17	[4] 21	[7] 2.0	[7] 2.8	1.7	2.3	.7	1.5	75	115	380	525	90	190
Severely eroded rolling phase [5]	IIIe-1	12	40		18		2.5	1.0	2.1	.5	1.3		---	325	475	40	150
Huntington silt loam	IIw-2	40	70	16	23	3.0	4.0	2.5	3.3	1.3	1.9	130	190	325	500	150	240
Huntington fine sandy loam	IIw-2	35	65	14	22	2.8	3.6	2.2	3.0	1.1	1.7	120	200	320	520	145	215
Jefferson loam:																	
Eroded undulating phase	IIe-3	28	53	15	22	2.5	3.5	1.9	2.9	.8	1.5	115	190	400	550	75	155
Eroded rolling phase	IIIe-3	24	48	12	20	1.8	2.8	1.7	2.6	.7	1.2	100	170	350	520	65	140
Johnsburg loam	IIIw-1	22	46		22			1.8	2.8	.7	1.6	70	180	---	---	70	140
Leadvale silt loam:																	
Eroded undulating phase	IIIw-1	20	45	14	22	1.5	2.5	1.8	2.8	.5	1.1	80	150	325	500	55	135
Eroded rolling phase	IIIw-1	17	40	10	17			1.5	2.4	.4	.9	50	120	280	450	40	100
Lickdale loam [6]	IVw-1	---	50	---	20	---	---	---	2.5	.6	1.2	---	---	---	---	50	150
Lindside silt loam [6]	IIw-1	40	70		20	---	---	2.5	3.3	1.3	1.9	---	---	---	---	160	240
Linker fine sandy loam:																	
Eroded undulating phase	IIe-3	28	58	15	21	2.5	3.4	2.0	3.0	.8	1.5	120	200	450	625	55	140
Eroded rolling phase	IIIe-3	24	48	14	20	[7] 1.8	[7] 2.8	1.5	2.5	.7	1.2	110	170	330	525	50	135
Litz silt loam:																	
Rolling phase	IVe-3	10	20	[4] 10	[4] 16	---	---	1.5	2.4	.5	1.0	---	[7] 50	200	450	45	120
Hilly phase	VIe-3	10	18	---	---	---	---	1.3	2.2	.5	.9	---	---	---	220	35	100
Steep phase	VIIe-3		---	---	---		---	---	---	---		---	---	---	---	30	70
Litz shaly silty clay loam:																	
Eroded rolling phase	VIe-3	8	15	---	---	---	---	1.2	2.0	.4	.8	---	---	150	325	35	100
Eroded hilly phase	VIe-3	---	---	---	---			1.2	2.0	.4	.8	---	---	---	---	30	80
Eroded steep phase	VIIe-3	---		---	---	---	---		---	---	---	---	---	---	---	23	70
Melvin silt loam [6]	IVw-1		50	---	---	---	---		2.5	.6	1.4	---	---	---	---	90	200
Minvale cherty silt loam:																	
Eroded undulating phase	IIe-2	26	54	16	24	2.4	3.5	1.8	2.8	.7	1.4	75	120	330	550	85	170
Rolling phase	IIIe-2	22	44	[4] 14	[4] 20	[7] 2.0	[7] 3.0	1.7	2.7	.7	1.4	65	110	300	520	70	150
Eroded rolling phase	IIIe-2	21	40	[4] 13	[4] 20	1.9	2.3	1.6	2.3	.6	1.3	60	100	290	500	65	145
Minvale silt loam:																	
Eroded undulating phase	IIe-2	28	55	16	23	2.5	3.8	2.0	2.8	.8	1.5	100	180	340	560	90	180
Eroded rolling phase	IIIe-2	25	50	[4] 13	[4] 21	[7] 2.0	[7] 3.0	1.8	2.6	.7	1.4	80	150	250	525	70	140
Muse silt loam:																	
Eroded undulating phase	IIe-2	30	58	18	25	2.6	3.5	2.1	3.3	.9	1.8	85	150	340	580	100	200
Eroded rolling phase	IIIe-2	25	50	[4] 15	[4] 20	[7] 1.5	[7] 2.5	2.2	3.0	.7	1.4	70	130	300	525	90	180
Muse silty clay loam, severely eroded rolling phase [5]	IVe-3	12	20		16		2.0	1.5	2.3	.4	.9		90	200	325	25	100
Muskingum fine sandy loam:																	
Hilly phase	VIe-3	---	---	8	14	---	---	---		.6	.8	---	---	---	---	35	120
Eroded hilly phase	VIe-3	---		8	14			---	---	.4	.8		---	---	---	35	120
Muskingum stony fine sandy loam:																	
Rolling phase	IVe-3	---	---	---	---	---		---	---	---	---	---	---	---	---	35	120
Hilly phase	VIe-3	---			---			---	---	---	---	---	---	---	---	25	70
Ooltewah silt loam [6]	IIw-1	40	70	---	20	---	---	2.5	3.3	1.3	1.9	---	---	---	460	150	240
Pace cherty silt loam:																	
Eroded undulating phase	IIIw-1	25	50	14	20	2.0	3.0	1.8	2.8	.7	1.4	70	170	325	525	85	170
Rolling phase	IIIw-1	23	47	12	18	[7] 1.6	[7] 2.5	1.6	2.5	.6	1.2	60	110	300	500	80	160
Eroded rolling phase	IIIw-1	20	45	11	16	[7] 1.5	[7] 2.5	1.5	2.5	.5	1.0	60	110	280	480	75	155
Philo loam [6]	IIw-1	30	55		18	---	---	2.0	3.0	.9	1.7	---		---	---	100	210
Pope loam	IIw-2	32	60	13	20	---	---	2.0	3.0	1.0	1.6	110	190	---	[8] 500	130	220
Pottsville loam, hilly phase	VIe-3	---	---	---	---	---	---	---	---	---	---	---		---	---	40	125

See footnotes at end of table.

TABLE 8.— *Estimated average acre yields of principal crops under two levels of management*—Continued

Soil	Capability unit	Corn		Wheat		Hay: Alfalfa		Hay: Soybean		Hay: Lespedeza		Potatoes		Cotton (lint)		Pasture	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Pottsville shaly loam, eroded hilly phase	VIe-3															30	110
Robertsville silt loam [6]	IVw-1		50		20				2.8	.6	1.2					60	180
Rockland:																	
Limestone, steep	VIIe-2																
Sandstone, steep	VIIe-2																
Sandstone, rolling	VIIe-2															20	45
Sequatchie fine sandy loam:																	
Undulating phase	IIe-3	38	65	18	25	2.7	3.7	2.0	3.0	1.1	1.8	110	230	450	625	[3] 90	[3] 170
Eroded undulating phase	IIe-3	35	60	17	24	2.6	3.6	2.0	3.0	.9	1.6	100	210	430	625	90	170
Sequoia silty clay, severely eroded rolling phase [5]	IVe-5	15	30					1.2	2.5	.4	.8			165	330	30	100
Staser loam, local alluvium phase	I-1	30	60	12	22	[8] 2.8	[8] 3.6	2.0	3.0	1.1	1.7	120	190	300	500	140	215
Stony smooth land, Talbott and Colbert soil materials	VIe-2															45	90
Stony rolling land, Talbott and Colbert soil materials	VIe-2															30	70
Stony colluvial land, steep	VIIe-2																
Talbott silty clay loam:																	
Eroded undulating phase	IIIe-4	28	42	15	21	2.0	2.8	1.8	2.8	.7	1.3			240	410	80	155
Eroded rolling phase	IVe-5	22	36	13	18	1.8	2.7	1.5	2.5	.5	1.0			200	340	70	135
Talbott silty clay:																	
Severely eroded rolling phase [5]	IVe-5		32	9	14			1.0	2.0	.2	.7			140	280	30	100
Severely eroded hilly phase [5]	VIe-3		25		12					.2	.6				250	25	90
Tellico loam, steep phase	VIIe-3																
Tellico clay loam:																	
Eroded rolling phase	IVe-5	12	30					1.5	2.2	.5	.9			225	425	30	110
Severely eroded hilly phase [5]	VIe-3	10	28						2.0	.2	.8			150	300	25	70
Severely eroded steep phase	VIIe-3																
Tupelo silt loam [6]	IIIs-1	15	35	9	18			2.0	2.8	.7	1.2			200	400	70	130

[1] Cow-acre-days is a term used to express the carrying capacity of pastureland. It represents the number of days a year that 1 acre will graze a cow of mature age without injury to the pasture.

[2] Crop not commonly grown on this soil because of flooding, freezing, and lodging.

[3] Pasture is not commonly grown because the soil is too desirable for other crops.

[4] Crop is seldom grown on strongly rolling or hilly areas; estimated yields are for moderately rolling or moderately sloping areas.

[5] Yields in columns B are for areas of the soil that have been reclaimed by smoothing with heavy machinery and by fertilizing heavily.

[6] Management for yields in columns B include the establishment of adequate drainage.

[7] The yields on this soil are for selected areas having relatively mild slopes and little damage from erosion.

[8] Crop is grown only on selected areas of the soil.

The yields in columns B are based largely on estimates of men who have had experience with the soils and crops of the county. Known deficiencies of the soils were considered, and estimates were made on how much crop yields might increase if these deficiencies were corrected within practical limits. The yields in columns B may be used as production goals that may be attained by using improved management practices now feasible. Improved management refers to the proper choice and rotation of crops; the correct use of commercial fertilizers, lime, and manure; proper tillage methods; the return of organic matter to the soil; mechanical means of water control; the maintenance or improvement of productivity and workability; and the conservation of soil material, plant nutrients, and soil moisture. The requirements of improved management will vary according to the soils, but the practices given in table 7 are considered necessary to obtain the yields shown in columns B of table 8.

The comparison of yields in columns B with those in columns A gives some idea of the responses that may be expected under improved management. On practically all soils of the county, more intensive management will bring increased yields.

Engineering Applications[6]

This soil survey report for De Kalb County, Alabama, contains information which can be used by engineers to:

(1) Make soil and land-use studies that will aid in the selection and development of industrial, business, residential, and recreational sites.
(2) Make estimates of runoff and erosion characteristics, for use in designing drainage structures and planning dams and other structures for water and soil conservation.
(3) Make reconnaissance surveys of soil and ground conditions that will aid in selecting highway and airport locations and in planning detailed soil surveys for the intended locations.
(4) Locate sand and gravel for use in structures.
(5) Correlate pavement performance with types of soil and thus develop information that will be useful in designing and maintaining the pavements.
(6) Determine the suitability of soil units for cross-county movements of vehicles and construction equipment.
(7) Supplement information obtained from other published maps and reports and aerial photographs, for the purpose of making soil maps and reports that can be readily used by engineers.

The mapping and the descriptive report are somewhat generalized, however, and should be used only in planning more detailed field surveys to determine the in-place condition of the soil at the site of the proposed engineering construction.

Soil science terminology

Some of the terms used by the agricultural soil scientist may be unfamiliar to the engineer, and some words—for example, soil, clay, silt, sand, aggregate, and granular—may have special meanings in soil science. These terms, as well as others that are used in the soil survey report, are defined in the glossary. Aggregate is not defined in the glossary, although it is referred to in the definition of soil structure. It is defined as follows:

Aggregate: A cluster of primary soil particles held together by internal forces to form a clod or fragment.

Soil test data and engineering soil classifications

To be able to make the best use of the soil maps and the soil survey reports, the engineer should know the physical properties of the soil materials and the in-place condition of the soil. After testing soil materials and observing the behavior of soils when used in engineering structures and foundations, the engineer can develop design recommendations for the soil units delineated on the maps.

Soil test data

Soil samples from the principal soil type of each of 19 extensive soil series were tested in accordance with standard procedures (*2*) to help evaluate the soils for engineering purposes. The test data are given in table 9. However, none of these samples were obtained from a greater depth than 50 inches, hence are not representative of the materials that may be encountered in earthwork in colluvium, alluvium, and cherty residuum at a depth of more than a few feet.

The engineering soil classifications in table 9 are based on data obtained by mechanical analyses and by tests to determine liquid limits and plastic limits. Mechanical analyses were made by combined sieve and hydrometer methods. Percentage of clay obtained by the hydrometer method should not be used in naming soil texture classes.

The liquid limit and plastic limit tests measure the effect of water on the consistence of the soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a solid to semisolid or plastic state. As the moisture content is further increased, the material changes from the plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from a solid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and plastic limit. It indicates the range of moisture content within which a soil material is in a plastic condition.

Table 9 also gives compaction (moisture-density) data for the tested soils. If a soil material is compacted at successively higher moisture contents, assuming that the compactive effort remains constant, the density of the compacted material will increase until the "optimum moisture content" is reached. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed "maximum dry density." Moisture-density data are important in earthwork, for as a rule optimum stability is obtained if the soil is compacted to about the maximum dry density, when it is at approximately the optimum moisture content.

[6] This section was prepared by the Division of Physical Research, Bureau of Public Roads. Test data in table 9 were obtained in the Soils Laboratory, Bureau of Public Roads.

TABLE 9.—*Engineering test data*[1] *for soil*

Soil name and location	Parent material	Bureau of Public Roads report No.	Depth	Horizon	Moisture-density: Maximum dry density	Moisture-density: Optimum moisture	Mechanical analysis[2] — Discarded in field sampling: Larger than 3 inches	Mechanical analysis[2] — Discarded in field sampling: 3 in. to 1 in.
			Inches		*Lb. per cu. ft.*	*Percent*	*Percent*	*Percent*
Allen loam:								
NW¼NW¼ sec. 10, T. 7 S., R. 8 E.	Colluvium, mainly from sandstone.	88438	1-11		122	11	--	--
		88439	11-32	B_2	122	12	--	--
		88440	32-48		116	15	--	--
Apison loam:								
SW¼SE¼ sec. 24, T. 7 S., R. 7 E.	Clay shale	88457	0-7		112	15	--	--
		88458	7-22		105	20	--	--
		88459	22-35		98	24	--	--
NW¼SW¼ sec. 5, T. 7 S., R. 10 E.	Sandy shale	88460	2-9	A_2	112	13	--	--
		88461	9-25	B	116	14	--	--
		88462	25-45	C	108	18	--	--
Atkins silt loam:								
NW¼SW¼ sec. 29, T. 8 S., R. 7 E.	Alluvium	88441	0-14		99	22	--	--
		88442	14-32		112	14	--	--
Capshaw silt loam:								
SW¼SE¼ sec. 20, T. 5 S., R. 10 E.	Alluvium (terrace)	88443	0-8		116	12	--	--
		88444	8-25		121	12	--	--
		88445	25-38		116	15	--	--
NW¼SE¼ sec. 18, T. 8 S., R. 8 E.	Alluvium (terrace)	88446	0-5		115	15	--	--
		88447	5-16		113	16	--	--
		88448	16-36		99	24	--	--
Clarksville cherty silt loam:								
NW¼NW¼ sec. 30, T. 6 S., R. 9 E.	Chert	88452	1-9		102	21	--	2
		88453	9-25		113	14	--	5
		88454	25-40		120	12	5	15
Colbert silty clay loam:								
NE¼SW¼ sec. 18, T. 8 S., R. 8 E.	Clayey limestone and shale.	88449	0-6		117	13	--	--
		88450	6-20		--	--	--	--
		88451	20-36		113	17	--	--
Crossville loam:								
SW¼SE¼ sec. 7, T. 8 S., R. 9 E.	Sandstone	88455	0-14		106	19	--	--
		88456	14-27		105	18	--	--
Etowah silt loam:								
NW¼NW¼ sec. 10, T. 9 S., R. 7 E.	Alluvium (terrace)	88463	3-12		116	13	--	--
		88464	12-25		119	13	--	--
		88465	25-42		110	18	--	--
Fullerton cherty silt loam:								
SW¼SW¼ sec. 11, T. 7 S., R. 8 E.	Chert	88466	0-11		110	14	--	3
		88467	11-27		111	16	--	--
		88468	27-48		102	22	--	--
Greendale cherty silt loam:								
SE¼NE¼ sec. 3, T. 6 S., R. 9 E.	Colluvium from chert and cherty limestone.	88469	0-12		114	13	--	--
		88470	12-26		124	11	--	4
Hartsells fine sandy loam:								
SE¼SW¼ sec. 34, T. 6 S., R. 8 E.	Sandstone and conglomerate.	88471	0-9		119	10	--	--
		88472	9-28		123	11	--	--
		88473	28-48		121	11	--	--
Huntington silt loam:								
SE¼NW¼ sec. 3, T. 9 S., R. 7 E.	Alluvium from limestone.	88474	0-12		105	18	--	--
		88475	12-30		115	13	--	--
Johnsburg loam:								
SE¼NE¼ sec. 30, T. 8 S., R. 7 E.	Sandstone and conglomerate.	88476	1-9		112	13	--	--
		88477	9-24		117	13	--	--
		88478	24-36		108	19	--	--
Linker fine sandy loam:								
NW¼NW¼ sec. 8, T. 9 S., R. 8 E.	Sandstone and conglomerate.	88481	0-9		122	11	--	--
		88482	9-25		114	15	--	--
		88483	25-50		106	19	--	--
Litz shaly silty clay loam:								
SW¼NW¼ sec. 7, T. 5 S., R. 10 E.	Clay shale, limestone, and sandstone.	88479	1-8		107	17	--	--
		88480	8-30		106	19	--	--
Melvin silt loam:								
NW¼SE¼ sec. 3, T. 9 S., R. 7 E.	Alluvium, mainly from limestone.	88484	1-10		116	14	--	--
		88485	10-32		116	12	--	--
Minvale cherty silt loam:								
SE¼SE¼ sec. 31, T. 7 S., R. 8 E.	Colluvium from chert	88486	3-11	A_2	111	14	2	2
		88487	11-30	B_2	117	13	3	2
		88488	30-48	C	118	13	1	2

samples taken from 21 soil profiles

Mechanical analysis [2] Continued															Liquid limit	Plasticity index	Classification	
Percentage passing sieve [3]											Percentage smaller than [3]							
3-in.	2-in.	1½-in.	1-in.	¾-in.	⅜-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.25 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			A.A.S.H.O. [4]	Unified [5]
------	------	------	------	100	95	92	87	80	71	55	49	32	18	13	20	4	A-4 (4)	ML-CL.
------	------	------	------	100	98	97	94	88	71	66	61	50	29	23	27	10	A-4 (6)	CL.
------	------	------	100	96	94	93	89	83	76	58	55	47	34	28	38	17	A-6 (7)	CL.
------	------	------	------	------	100	99	99	98	95	77	64	32	15	11	19	2	A-4 (8)	ML.
------	------	------	------	------	------	------	------	100	99	93	82	56	41	33	42	16	A-7-6 (11)	ML-CL.
------	------	------	------	------	------	------	------	------	100	96	86	61	50	42	57	22	A-7-5 (16)	MH.
------	------	------	------	100	99	98	97	96	95	49	43	27	16	12	21	4	A-4 (3)	SM-SC.
------	------	100	97	96	93	89	86	85	84	57	52	38	26	21	31	10	A-4 (4)	ML-CL.
------	------	------	------	------	------	------	------	------	100	93	82	50	34	25	35	11	A-6 (8)	ML-CL.
------	------	------	------	------	------	------	------	100	99	92	90	79	41	27	38	12	A-6 (9)	ML-CL.
------	------	------	------	------	------	------	100	99	93	63	59	44	22	15	26	7	A-4 (6)	ML-CL.
------	------	------	------	------	100	99	96	91	85	65	58	36	18	12	21	4	A-4 (6)	ML-CL.
------	------	------	------	------	------	100	99	95	91	78	72	57	30	22	25	10	A-4 (8)	CL.
------	------	------	------	------	------	100	99	93	88	74	71	59	37	27	32	12	A-6 (9)	CL.
------	------	------	------	100	99	98	97	91	88	80	73	53	36	30	32	13	A-6 (9)	CL.
------	------	------	------	100	98	97	96	90	87	79	72	54	37	31	37	17	A-6 (11)	CL.
------	------	100	97	97	97	97	97	95	94	89	85	75	60	50	64	34	A-7-5 (20)	MH-CH.
100	------	------	98	95	90	85	78	67	65	60	58	40	21	13	27	4	A-4 (5)	ML-CL.
100			90	81	67	55	47	37	35	32	31	26	11	8	24	4	A-2-4 (0)	GM-GC.
95	------	------	80	75	58	41	26	14	12	10	10	8	2	2	21	2	A-1-a (0)	GW-GM.
------	------	------	------	------	------	100	99	88	85	76	69	48	23	18	23	5	A-4 (8)	ML-CL.
------	------	------	------	------	------	------	100	95	93	89	85	69	43	33	37	16	A-6 (10)	CL.
------	------	------	------	------	------	------	100	94	92	86	83	72	54	47	55	27	A-7-6 (18)	MH-CH.
------	------	------	------	100	99	98	97	93	75	63	63	58	39	34	36	11	A-6 (6)	ML-CL.
------	------	100	98	96	93	86	83	79	63	52	52	47	35	31	37	11	A-6 (4)	ML-CL.
------	------	------	------	------	------	------	100	93	90	81	73	43	24	18	24	6	A-4 (8)	ML-CL.
------	------	------	------	------	------	------	100	94	92	87	82	60	35	26	29	11	A-6 (8)	CL.
------	------	------	------	------	------	------	100	95	93	88	84	71	46	38	43	19	A-7-6 (12)	CL.
100	------	------	97	97	94	87	80	70	64	51	48	36	16	10	26	5	A-4 (3)	ML-CL.
------	------	------	------	100	95	90	85	73	69	60	59	50	31	17	26	6	A-4 (5)	ML-CL.
------	------	100	98	96	90	87	84	71	66	55	54	50	41	32	43	19	A-7-6 (8)	CL.
------	100	96	94	91	77	64	53	38	32	22	21	15	11	6	29	7	A-2-4 (0)	SM-SC.
100	------	------	96	92	84	74	64	44	36	29	26	18	12	9	20	4	A-2-4 (0)	SM-SC.
------	------	------	------	------	100	99	99	98	90	40	39	31	12	7	NP	NP	A-4 (1)	SM.
------	------	------	------	------	------	------	100	99	94	53	51	42	20	14	20	7	A-4 (4)	ML-CL.
------	------	------	------	------	------	------	100	99	95	48	45	35	22	16	21	6	A-4 (3)	SM-SC.
------	------	------	------	------	------	------	------	------	100	99	96	81	35	24	35	12	A-6 (9)	ML-CL.
------	------	------	100	99	96	94	92	88	86	82	75	57	23	15	25	7	A-4 (8)	ML-CL.
------	------	------	------	------	------	------	100	99	91	69	64	48	19	12	21	4	A-4 (7)	ML-CL.
------	------	------	------	------	------	------	100	99	93	74	70	56	28	22	27	9	A-4 (8)	CL.
------	------	------	------	------	------	------	100	98	89	75	73	62	40	33	43	19	A-7-6 (12)	CL.
------	------	------	------	------	100	97	95	86	73	51	49	41	21	16	20	6	A-4 (3)	ML-CL.
------	------	------	------	------	100	98	96	87	75	58	58	50	33	28	32	13	A-6 (6)	CL.
------	------	------	------	------	100	99	97	89	79	63	62	57	44	41	41	13	A-7-6 (7)	ML.
------	------	100	98	98	95	93	88	82	80	77	70	51	34	24	32	8	A-4 (8)	ML-CL.
------	------	100	90	77	66	57	48	45	45	44	43	40	29	22	43	17	A-7-6 (4)	GC.
------	------	------	100	99	97	94	89	81	76	68	63	46	29	23	31	14	A-6 (8)	CL.
------	------	------	------	100	97	93	89	77	72	60	55	39	18	12	24	6	A-4 (5)	ML-CL.
98	------	------	96	93	86	79	72	61	57	48	46	38	19	13	27	7	A-4 (3)	SM-SC.
97	------	------	95	90	78	62	48	38	35	31	31	28	17	12	29	11	A-2-6 (0)	GC.
99	------	------	97	95	90	82	74	63	58	49	48	41	23	16	25	8	A-4 (3)	SC.

See footnotes at end of table.

TABLE 9.—*Engineering test data[1] for soil*

Soil name and location	Parent material	Bureau of Public Roads report No.	Depth	Horizon	Moisture-density: Maximum dry density	Moisture-density: Optimum moisture	Mechanical analysis[2]: Discarded in field sampling: Larger than 3 inches	Mechanical analysis[2]: Discarded in field sampling: 3 in. to 1 in.
			Inches		*Lb. per cu. ft.*	*Percent*	*Percent*	*Percent*
Muskingum stony fine sandy loam:								
SE¼NE¼ sec. 29, T. 6 S., R. 10 E	Sandstone	88489	0-7		110	14		
		88490	7-17		119	12		
Talbott silty clay loam:								
NE¼SE¼ sec. 33, T. 7 S., R. 8 E	Clayey limestone and shale.	88491	0-7		116	13		
		88492	7-27		116	15		
		88493	27-48		108	18		

[1] Tests performed by Bureau of Public Roads in accordance with standard procedures of the American Association of State Highway Officials (A.A.S.H.O.).

[2] Mechanical analyses according to the American Association of State Highway Officials Designation: T 88-54. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the A.A.S.H.O. procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 mm. in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than

samples taken from 21 soil profiles—Continued

Mechanical analysis [2]—Continued																	Classification	
Percentage passing sieve [3]											Percentage smaller than [3]				Liquid limit	Plasticity index		
3-in.	2-in.	1½-in.	1-in.	¾-in.	⅜-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.25 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			A.A.S.H.O. [4]	Unified [5]
-------	100	97	97	97	96	95	95	91	67	40	39	33	19	14	24	5	A-4 (1)	SM-SC.
-------	-------	-------	100	99	99	99	99	95	72	47	46	41	25	20	22	6	A-4 (2)	SM-SC.
-------	-------	-------	-------	100	99	98	97	91	85	72	67	48	29	20	26	10	A-4 (7)	CL.
-------	-------	-------	-------	100	99	99	98	91	84	68	65	54	33	27	32	13	A-6 (8)	CL.
-------	-------	-------	-------	-------	100	99	98	93	85	67	65	57	40	33	39	14	A-6 (8)	ML-CL.

2 mm. in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soils.

[3] Based on total material. Laboratory test data corrected for amount discarded in field sampling.

[4] The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, A.A.S.H.O. Designation: M 145-49.

[5] The Unified Soil Classification System, Technical Memorandum No. 3-357, v. 1, Waterways Experiment Station, March 1953 (7).

Engineering classifications systems

Most highway engineers classify soil materials in accordance with the system approved by the American Association of State Highway Officials (*2*). In this system, soil materials are classified in seven principal groups. The groups range from A-1, consisting of gravelly soils of high bearing capacity, to A-7, consisting of clay soils having low strength when wet. Within each group, the relative engineering value of the soil material is indicated by a group index number. Group indexes range from 0 for the best materials to 20 for the poorest. The group index number is shown in parentheses, following the soil group symbol, in the next to last column of table 9. The principal characteristics according to which soils are classified in this system are shown in table 10.

Some engineers prefer to use the Unified Soil Classification System (*7*). In this system, soil materials are identified as coarse-grained (8 classes), fine-grained (6 classes), or highly organic. The principal characteristics of the 15 classes of soil are given in table 11. The classification of the tested soils according to the Unified system is given in the last column of table 9.

Soil engineering data and recommendations

Some of the engineering information can be obtained from the soil map. It will often be necessary, however, to refer to other sections of the report, particularly to the sections General Character of the Area, The Soils of De Kalb County, and Soil Associations.

The soil test data in table 9, together with information given in the remainder of the report and experience with the same soils in other counties, were used in preparing the highway soil engineering data and recommendations given in table 12. There may be considerable variation in the texture (grain size) of the materials in one layer of a soil compared to another layer of the same soil, hence it should not be anticipated that the engineering soil classification given in table 12 will apply to all portions of the specific soil series.

The engineering characteristics of rockland, stony land, and stony colluvium are not given in table 12. The construction of roads in the first two, as well as in many of the residual and colluvial soil units, will normally require considerable rock excavation. These stony and rocky materials may be placed in the lower portions of embankments, but are not permitted in the upper layer of the embankments because they prevent the preparation of a smooth surface. Insofar as practicable, earthy materials should be used to fill the voids between the stones and rock fragments. The presence of stones in some soils, such as Allen stony loam, may preclude the use of tamping rollers in the compaction of the material when it is used in an embankment.

The shallow depth of bedrock in some areas and high percentage of chert or rock fragments in some soils are factors that promote the continuance of highway excavation throughout the winter season, provided the required standards of construction with respect to compaction of soil materials are maintained.

TABLE 10.—*Classification of soils by American Association of State Highway Officials* [1]

General classification	Granular materials (35 percent or less passing No. 200 sieve)							Silt-clay materials (More than 35 percent passing No. 200 sieve)				
Group classification	A-1		A-3	A-2				A-4	A-5	A-6	A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5	A-7-6
Sieve analysis: Percent passing—												
No. 10	50 maximum.											
No. 40	30 maximum.	50 maximum.	51 minimum.									
No. 200	15 maximum.	25 maximum.	10 maximum.	35 maximum.	35 maximum.	35 maximum.	35 maximum.	36 minimum.	36 minimum.	36 minimum.	36 minimum.	36 minimum.
Characteristics of fraction passing No. 40 sieve:												
Liquid limit			NP [2]	40 maximum.	41 minimum.	40 maximum.	41 minimum.	40 maximum.	41 minimum.	40 maximum.	41 minimum.	41 minimum.
Plasticity index	6 maximum.	6 maximum.	NP	10 maximum.	10 maximum.	11 minimum.	11 minimum.	10 maximum.	10 maximum.	11 minimum.	11 minimum.[3]	11 minimum.[3]
Group index	0	0	0	0	0	4 maximum.	4 maximum.	8 maximum.	12 maximum.	16 maximum.	20 maximum.	20 maximum.
Usual types of significant constituent materials.	Stone fragments, gravel, and sand.	Stone fragments, gravel, and sand.	Fine sand.	Silty gravel and sand.	Silty gravel and sand.	Clayey gravel and sand.	Clayey gravel and sand.	Nonplastic to moderately plastic silty soils.	Highly elastic silts.	Medium plastic clays.	Highly plastic clays.	Highly plastic clays.
General rating as subgrade.	Excellent to good.					Fair to poor.						

[1] Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (pt. 1; ed. 7): (2), The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, A.A.S.H.O. Designation: M 145-49.

[2] NP = nonplastic.

[3] Plasticity index of A-7-5 subgroup is equal to or less than LL minus 30. Plasticity index of A-7-6 subgroup is greater than LL minus 30.

TABLE 11.—*Characteristics of soil groups in Unified Soil Classification System* [1]

Major divisions	Group symbol	Soil description	Value as foundation material [2]	Value as base course directly under bituminous pavement	Value for embankments	Compaction characteristics and recommended equipment	Approximate range in A.A.S.H.O. maximum dry density [3]	Field (in-place) CBR	Subgrade modulus, k	Drainage characteristics	Comparable groups in A.A.S.H.O. classification
Coarse-grained soils (*less than 50 percent passing No. 200 sieve*):							*Lb./cu. ft.*		*Lb./sq.in./in.*		
	GW	Well-graded gravels and gravel-sand mixtures; little or no fines.	Excellent	Good	Very stable; use in pervious shells of dikes and dams.	Good; use crawler-type tractor, pneumatic-tire roller, or steel-wheel roller.	125–135	60–80	300+	Excellent	A–1.
	GP	Poorly graded gravels and gravel-sand mixtures; little or no fines.	Good to excellent.	Poor to fair.	Reasonably stable; use in pervious shells of dikes and dams.	Same	115–125	25–60	300+	Excellent	A–1.
Gravels and gravelly soils (*more than half of coarse fraction retained on No. 4 sieve*).	GM	Silty gravels and gravel-sand-silt mixtures.	Good	Poor to good.	Reasonably stable; not particularly suited to shells, but may be used for impervious cores or blankets.	Good, but needs close control of moisture; use pneumatic-tire or sheepsfoot roller.	120–135	20–80	200–300+	Fair to practically impervious.	A–1 or A–2.
	GC	Clayey gravels and gravel-sand-clay mixtures.	Good	Poor	Fairly stable; may be used for impervious core.	Fair, use pneumatic-tire or sheepsfoot roller.	115–130	20–40	200–300	Poor to practically impervious.	A–2.
	SW	Well-graded sands and gravelly sands; little or no fines.	Good	Poor	Very stable; may be used in pervious sections; slope protection required.	Good; use crawler-type tractor or pneumatic-tire roller.	110–130	20–40	200–300	Excellent	A–1.
	SP	Poorly graded sands and gravelly sands; little or no fines.	Fair to good.	Poor to not suitable.	Reasonably stable; may be used in dike section having flat slopes.	Same	100–120	10–25	200–300	Excellent	A–1 or A–3.
Sands and sandy soils (*more than half of coarse fraction passing No. 4 sieve*).	SM	Silty sands and sand-silt mixtures.	Fair to good.	Same	Fairly stable; not particularly suited to shells, but may be used for impervious cores or dikes.	Good, but needs close control of moisture; use pneumatic-tire or sheepsfoot roller.	110–125	10–40	200–300	Fair to practically impervious.	A–1, A–2, or A–4.
	SC	Clayey sands and sand-clay mixtures.	Fair to good.	Not suitable.	Fairly stable; use as impervious core for flood-control structures.	Fair; use pneumatic-tire roller or sheepsfoot roller.	105–125	10–20	200–300	Poor to practically impervious.	A–2, A–4, or A–6.
Fine-grained soils (*more than 50 percent passing No. 200 sieve*):											
	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, and clayey silts of slight plasticity.	Fair to poor.	Not suitable.	Poor stability; may be used for embankments if properly controlled.	Good to poor; close control of moisture is essential; use pneumatic-tire or sheepsfoot roller.	95–120	5–15	100–200	Fair to poor	A–4, A–5, or A–6.
Silts and clays (*liquid limit of 50 or less*).	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, and lean clays.	Fair to poor.	Not suitable.	Stable; use in impervious cores and blankets.	Fair to good; use pneumatic-tire or sheepsfoot roller.	95–120	5–15	100–200	Practically impervious.	A–4, A–6, or A–7.
	OL	Organic silts and organic clays having low plasticity.	Poor	Not suitable.	Not suitable for embankments.	Fair to poor; use sheepsfoot roller.[4]	80–100	4–8	100–200	Poor	A–4, A–5, A–6, or A–7.
	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, and elastic silts.	Poor	Not suitable.	Poor stability; use in core of hydraulic fill dam; not desirable in rolled fill construction.	Poor to very poor; use sheepsfoot roller.[4]	70–95	4–8	100–200	Fair to poor	A–5 or A–7.
Silts and clays (*liquid limit greater than 50*).	CH	Inorganic clays having high plasticity and fat clays.	Poor to very poor.	Not suitable.	Fair stability on flat slopes; use in thin cores, blankets, and dike sections of dams.	Fair to poor; use sheepsfoot roller.[4]	75–105	3–5	50–100	Practically impervious.	A–7.
	OH	Organic clays having medium to high plasticity and organic silts.	Same	Not suitable.	Not suitable for embankments.	Poor to very poor; use sheepsfoot roller.[4]	65–100	3–5	50–100	Practically impervious.	A–5 or A–7.
Highly organic soils	Pt	Peat and other highly organic soils.	Not suitable.	Not suitable.	Not used in embankments, dams, or subgrades for pavements.					Fair to poor	None.

[1] Based on information in The Unified Soil Classification System (7). Ratings and ranges in test values are for guidance only. Design should be based on field survey and test of samples from construction site.

[2] Ratings are for subgrade and subbases for flexible pavement.

[3] Determined in accordance with test designation: T 99-49, A.A.S.H.O.

[4] Pneumatic-tire rollers may be advisable, particularly when moisture content is higher than optimum.

TABLE 12.—*Highway soil engineering*

UPLAND SOILS

Soil series, type or phase	Brief description of ground condition and soil material	Dominant slope	Estimated soil classification		Adaptability to winter grading [1]
			A.A.S.H.O.	Unified	
		Percent			
Apison	1 to 3½ feet of well-drained silty clay loam or silty clay on sandstone, shale, or siltstone.	2–10	A–6 or A–7	CL, CH, or ML.	Not adapted
Clarksville	2 to 3 feet of well to excessively drained cherty silty clay loam or cherty clay on cherty residuum; cherty dolomitic limestone bedrock usually at depths of more than 20 feet.	5–45	A–2, A–4, or A–6 on A–1, A–2, or A–4.	GM, GC, ML, or CL on GW, GP, GM, or GC.	Fair to good
Colbert	½ to 3½ feet of poorly to moderately well drained very plastic silty clay or clay on clayey limestone or shale.	2–12	A–6 or A–7	CL, CH, or MH.	Not adapted
Crossville	½ to 1½ feet of moderately well to well drained loam or rocky loam on ½ to 1½ feet sandy clay loam, with sandstone or conglomerate bedrock at depth of 1 to 2½ feet.	2–10	A–4 or A–6	ML or CL	Limited
Dewey	8 to 20 feet of well-drained silty clay on limestone; in places, has chert fragments at depths greater than 3 feet.	5–25	A–6 or A–7	CL, CH, or MH.	Not adapted
Dowellton	1½ to 2½ feet of somewhat poorly to moderately well drained very plastic clay on clayey limestone or calcareous clay shale.	0–2	A–7	CH	Not adapted
Fullerton	2 to 4 feet of well to excessively drained cherty silty clay loam to cherty clay on cherty residuum. Depth to cherty dolomitic limestone is 10 to 40 feet.	5–25	A–4, A–6, or A–7, on A–2 or A–4.	CL, CH, or MH on GM, or GC.	Fair
Hartsells, shallow phase	1 to 2½ feet of well-drained sandy clay loam to sandy clay on sandstone or conglomerate.	2–10	A–4 or A–6	SC or CL	Limited
Hartsells, regular phase	2 to 5 feet of well-drained sandy clay loam to sandy clay on sandstone or conglomerate.	2–10	A–4 or A–6	SC or CL	Limited
Johnsburg	2½ to 5 feet of somewhat poorly drained loam to silty clay on sandstone, conglomerate, or shale. In places a compact cemented layer occurs at depth of 2 to 2½ feet.	0–3	A–4, A–6, or A–7.	ML, CL, MH, or CH.	Limited
Lickdale	3 to 5 feet of very poorly to poorly drained sandy or silty clay on sandstone, conglomerate, or shale.	0–2	A–6 or A–7	CL, CH, or MH.	Not adapted
Linker	2½ to 5 feet of well-drained sandy clay loam to sandy clay on sandstone, conglomerate, or shale.	2–10	A–6 or A–7	ML, CL, MH, or CH.	Limited
Litz	1 to 2 feet of excessively drained silt loam or shaly silt loam to shaly clay on calcareous shale.	5–15	A–4, A–6, or A–7.	GC, ML, or CL.	Limited
Muskingum	½ to 3 feet of excessively drained sandy loam or stony sandy loam to sandy clay or stony sandy clay on sandstone; in places, bedrock is shale or siltstone.	5–20	A–2, A–4, or A–6.	SM, SC, ML, or CL.	Poor to fair
Pottsville	½ to 1½ feet of excessively drained sandy clay to shaly clay primarily on shale; in places, bedrock is sandstone or siltstone.	10–20	A–6 or A–7	GC, ML, or CL.	Limited
Sequoia	½ to 1½ feet of somewhat excessively drained silty clay to shaly silty clay on shale.	5–45	A–7	MH or CH	Not adapted
Talbott, undulating phase.	2 to 6 feet of well-drained silty clay or clay, primarily on clayey limestone.	2–5	A–6 or A–7	CL, CH, or MH.	Not adapted
Talbott, rolling and hilly phases.	½ to 5 feet of well to excessively drained silty clay, primarily on clayey limestone.	5–25	A–6 or A–7	CL, CH, or MH.	Not adapted
Tellico	½ to 5 feet of well to somewhat excessively drained sandy clay or clay on calcareous sandstone and shale.	5–45	A–6 or A–7	CL, CH, or MH.	Not adapted

COLLUVIAL SOILS

Soil series, type or phase	Brief description of ground condition and soil material	Dominant slope	A.A.S.H.O.	Unified	Adaptability to winter grading [1]
Abernathy	6+ feet of moderately well to well drained silty clay loam on limestone.	0–5	A–6 or A–7	CL, CH, or MH.	Not adapted
Allen loam and clay loam.	1½ to 8 feet of well-drained sandy loam to clay loam derived from sandstone, shale, or limestone, over bedrock.	2–25	A–4 or A–6	ML or CL	Limited
Allen, stony phase	1½ to 7 feet of well-drained stony clay loam derived from sandstone, shale, or limestone; stones range to more than 12 inches in size. Over bedrock.	5–25	A–6	CL	Limited
Cotaco-Barbourville	2 to 7 feet of poorly to well drained loam to clay derived from sandstone or shale, over bedrock.	1–3	A–4, A–6, or A–7.	ML, CL, MH, or CH.	Limited

See footnotes at end of table.

UPLAND SOILS

Depth to seasonally high water table	Recommended location of grade line with respect to ground surface	Suitability as source of Topsoil [2]	Suitability as source of Sand-gravel	Remarks
Feet 20+	Influenced by bedrock	Good	Not suitable.	
20+	Anywhere	Fair	Poor to fair	Suitability as source of topsoil depends on stoniness. Requires addition of sand to meet specifications for base course for primary roads; may be suitable for surfacing county roads.
1–2 (Perched)	Influenced by bedrock	Not suitable	Not suitable	Seepage in cut sections; artificial drainage may be required.
1–2 (Perched)	Influenced by bedrock	Good	Not suitable	Same.
20+	Influenced by bedrock in deep cuts.	Good to fair	Not suitable	Soil is only fair source of topsoil when some of surface material has been removed by erosion.
0–2	2 feet minimum above ground surface.	Not suitable	Not suitable.	
20+	Influenced by bedrock in deep cuts.	Fair	Poor	Suitability as source of topsoil depends on stoniness. Requires addition of sand to meet specifications for base course for primary roads or for use as surfacing on county roads.
20+	Influenced by bedrock	Good	Limited	Weathered conglomerate may be source of base course material, and weathered sandstone may be suitable for blending with coarser grained material to produce base course material; blasting may be required.
20+	Influenced by bedrock	Good	Limited	Same.
1–2 (Perched)	Influenced by bedrock	Fair	Not suitable	Seepage in cut sections; artificial drainage may be required.
0–1 (Perched)	2 feet minimum above ground surface.	Good	Not suitable	Depressed areas can usually be drained by use of open ditches.
20+	Influenced by bedrock	Good	Limited	Weathered conglomerate may be source of base course material, and weathered sandstone may be suitable for blending with coarser grained material to produce base course material; blasting may be required.
20+	Influenced by bedrock	Poor	Not suitable.	
20+	Influenced by bedrock	Not suitable	Not suitable.	
20+	Influenced by bedrock	Poor	Not suitable.	
10+	Influenced by bedrock	Fair	Not suitable.	
20+	Influenced by bedrock	Not suitable	Not suitable.	
20+	Influenced by bedrock	Not suitable	Not suitable.	
20+	Influenced by bedrock	Poor	Not suitable.	
COLLUVIAL SOILS				
0–2 (Perched)	2 feet minimum above ground surface.	Good	Not suitable.	
20+	Influenced by bedrock	Poor to fair	Not suitable.	
20+	Influenced by bedrock	Poor	Not suitable	Suitability as source of topsoil depends on stoniness.
1–2 (Perched)	Influenced by bedrock	Good	Not suitable.	

COLLUVIAL SOILS (cont.)

Soil series, type or phase	Brief description of ground condition and soil material	Dominant slope	Estimated soil classification A.A.S.H.O.	Estimated soil classification Unified	Adaptability to winter grading [1]
		Percent			
Greendale	5 to 12 feet of moderately well to well drained cherty silt loam to cherty clay loam derived from chert or cherty limestone, over bedrock; chert fragments range to more than 6 inches in size.	0–6	A–2, A–4, or A–6.	GM, GC, ML, or CL.	Fair
Hermitage	4 to 10 feet of well-drained silty clay loam, silty clay, silt, and clay derived from limestone, over bedrock.	2–12	A–4, A–6, or A–7.	ML, CL, MH, or CH.	Limited
Jefferson	2 to 8 feet of well-drained sandy clay or silty clay derived primarily from sandstone and shale, over bedrock.	2–12	A–6 or A–7	CL, CH, or MH.	Not adapted
Leadvale	2½ to 8 feet of poorly to moderately well drained silty clay to shaly clay derived primarily from shale, over bedrock.	2–12	A–6 or A–7	CL, CH, or MH.	Not adapted
Minvale	4 to 20 feet of well-drained silty clay loam or cherty silty clay loam to clay or cherty clay derived from cherty dolomitic limestone, over bedrock.	2–12	A–2, A–4, A–6, or A–7.	GC, SC, ML, or CL.	Poor to fair
Muse	4 to 10 feet of well to somewhat excessively drained silty clay derived primarily from shale, over bedrock.	2–12	A–6 or A–7	CL, CH, or MH.	Not adapted
Ooltewah	5+ feet of poorly drained silt loam to silty clay derived from limestone, over bedrock.	0–2	A–4, A–6, or A–7.	ML or CL	Not adapted
Pace	4 to 20 feet of moderately well to well drained cherty silt loam to cherty silty clay derived primarily from cherty dolomitic limestone, over bedrock; chert fragments normally smaller than 2 inches.	2–12	A–2, A–4, or A–6.	GC, SC, ML, or CL.	Poor to fair

TERRACE SOILS

Soil series, type or phase	Brief description of ground condition and soil material	Dominant slope	Estimated soil classification A.A.S.H.O.	Estimated soil classification Unified	Adaptability to winter grading [1]
Capshaw	4 to 15 feet of moderately well drained silty clay loam to clay, derived primarily from limestone, but in places from sandstone or shale, over bedrock.	0–5	A–6 or A–7	CL, CH, or MH.	Not adapted
Etowah	4 to 20 feet of well-drained silty clay loam to silty clay, derived primarily from limestone but in places from sandstone or shale, over bedrock.	2–5	A–6 or A–7	CL, CH, or MH.	Limited
Robertsville	Poorly drained silty clay derived primarily from limestone, but in places from sandstone or shale, over bedrock.	0–2	A–6 or A–7	MH or CH	Not adapted
Sequatchie	5+ feet of well-drained loam to silty clay loam, with small gravel or chert and sandstone fragments in places, over bedrock. Derived primarily from sandstone or shale, but in places from limestone.	2–5	A–4 or A–6	ML or CL	Limited
Tupelo	3 to 7 feet of somewhat poorly to poorly drained silty clay or clay derived primarily from clayey limestone, over bedrock.	0–2	A–6 or A–7	CL, CH, or MH.	Not adapted

BOTTOM-LAND SOILS

Soil series, type or phase	Brief description of ground condition and soil material	Dominant slope	Estimated soil classification A.A.S.H.O.	Estimated soil classification Unified	Adaptability to winter grading [1]
Atkins	3+ feet of poorly drained stratified sand, silt, and clay, derived from sandstone and shale, over bedrock.	0–2	A–2, A–4, A–6, or A–7.	SM, SC, ML, or CL.	Not adapted
Dunning	1½ to 2½ feet of poorly drained clay on stratified silty and clayey materials derived from limestone, over bedrock.	0–2	A–4, A–6, or A–7.	ML, CL, MH, or CH.	Not adapted
Ennis	2 to 4 feet moderately well drained silt loam or cherty silt loam on chert, cherty limestone, or cherty dolomite. Depth to bedrock is greater than 4 feet.	0–2	A–2, A–4, or A–6.	GM, ML, or CL.	Limited
Hamblen	2½ to 4 feet of somewhat poorly drained silty clay to loam or sandy loam on stratified sand, silt, and clay derived primarily from sandstone and shale, over bedrock.	0–2	A–4 or A–6 on A–2, A–4, A–6, or A–7.	ML or CL on SM, SC, ML, or CL.	Not adapted
Huntington	2½ to 4 feet of well-drained silty clay to sandy loam on stratified sand, silt, and clay, derived primarily from limestone. Depth to limestone bedrock is 5 feet or more.	0–2	Same	Same	Limited

See footnotes at end of table.

COLLUVIAL SOILS (cont.)

Depth to seasonally high water table	Recommended location of grade line with respect to ground surface	Suitability as source of		Remarks
		Topsoil [2]	Sand-gravel	
Feet				
10+	Influenced by bedrock in deep cuts.	Not suitable	Limited	Too cherty to be used as topsoil. Usually requires addition of sand to meet specifications for base course for primary roads or for use as surfacing on county roads; thickness of deposit may limit suitability.
20+	Influenced by bedrock	Fair	Not suitable.	
20+	Influenced by bedrock	Fair to good	Not suitable.	
0 2 (Perched)	Influenced by bedrock	Fair	Not suitable.	
20+	Influenced by bedrock	Poor	Limited	Material underlying some areas may be made suitable for use in base course of primary roads or surfacing on county roads by the addition of sand.
1–2 (Perched)	Influenced by bedrock	Fair	Not suitable.	
0–1 (Perched)	2 feet minimum above ground surface.	Good	Not suitable.	
10+	Influenced by bedrock	Unsuitable	Limited	Material underlying some areas may be made suitable for use in base course of primary roads or surfacing on county roads by the addition of sand.
		TERRACE SOILS		
2–4	4 feet minimum above water table.	Good	Not suitable	Bedrock may be encountered in deep cuts if soil is shallow.
20+	Anywhere	Good	Not suitable	Same.
0–1	4 feet minimum above water table.	Poor	Not suitable.	
10+	Anywhere	Good	Not suitable	Bedrock may be encountered in deep cuts if soil is shallow.
1–2 (Perched)	Anywhere	Poor	Not suitable.	
		BOTTOM-LAND SOILS		
0	2 to 4 feet above high water	Poor	Not suitable.	
0	Same	Not suitable	Not suitable.	
1 3	Same	Fair to good	Limited	Cherty materials underlying some areas may be suitable for base course.
1–2	Same	Fair	Not suitable.	
2–3	Same	Good	Not suitable.	

TABLE 12.—*Highway soil engineering*

BOTTOM-LAND SOILS (cont.)

Soil series, type or phase	Brief description of ground condition and soil material	Dominant slope	Estimated soil classification		Adaptability to winter grading [1]
			A.A.S.H.O.	Unified	
		Percent			
Lindside	2½ to 4 feet of somewhat poorly drained silty clay loam to silt loam on stratified sand, silt, and clay, derived primarily from limestone. Depth to limestone bedrock is 5 feet or more.	0–2	Same	Same	Not adapted
Melvin	2 to 3 feet of poorly drained silty clay loam to sandy loam on stratified sand, silt and clay, derived primarily from limestone. Depth to limestone bedrock is 5 feet or more.	0–2	A–4, A–6, or A–7 on A–2, A–4, A–6, or A–7.	ML, CL, or CH on SM, SC, ML, or CL.	Not adapted
Philo	2 to 3½ feet of somewhat poorly drained silty clay to sandy clay loam on either stratified older alluvium or bedrock; older alluvium is clay to sandy clay, derived from sandstone or shale. Depth to bedrock is 2 to 7 feet.	0–2	A–6 or A–7	CL, CH, or MH.	Not adapted
Pope	3 to 4 feet of well-drained silty clay to sandy loam on stratified sand, silt, and clay, derived from sandstone or shale. Depth to bedrock is less than 7 feet.	0–2	A–4, A–6, or A–7 on A–2, A–4, A–6, or A–7.	ML or CL on SM, SC, ML, or CL.	Limited
Staser	1½ to 2½ feet of well-drained clay loam to loam on stratified sand, silt, and clay, derived primarily from sandstone or shale. Depth to bedrock is 5 feet or more.	0–5	A–4 or A–6 on A–2, A–4, A–6, or A–7.	Same	Limited

[1] The adaptability rating is for the soil material; rock excavation is permitted during the winter.

[2] Rating is for the surface or A-horizon material for use on embankment and cut slopes, and in ditches to promote the growth of vegetation.

data and recommendations—Continued

BOTTOM-LAND SOILS (cont.)

Depth to seasonally high water table	Recommended location of grade line with respect to ground surface	Suitability as source of		Remarks
		Topsoil [2]	Sand-gravel	
Feet 1–2	Same	Good	Not suitable.	
0 1	Same	Poor	Not suitable.	
1–2	Same	Fair	Not suitable.	
2 3	Same	Good	Not suitable.	
2-3	Same	Good	Not suitable.	

Many of the soils have a perched water table at a slight depth, hence a survey should be made to determine the need for interceptor ditches and underdrains. Seepage in the back slopes of cuts may result in slumping or sliding of the overlying material. A decrease in the bearing capacity of the foundation soil below the pavement, as a result of the perched water table, may cause deterioration of the pavement; this water may be intercepted by the construction of deeper side ditches.

On ridges and mountains the vertical location of roads should be such that a minimum of rock excavation will be required; this may require slight embankment sections in much of the upland. Considerable excavation (sidehill cut) in bedrock is required where the roads traverse the valley walls. The unweathered bedrock will usually require blasting before it can be excavated.

The lower parts of the bottom lands may be flooded each year, and a continuous embankment may be required in order for the roadways constructed in these lowlands to be above the high water level. Suitable materials for use in these embankments may be obtained from the nearby terrace and colluvial soils.

The ratings given for suitability of the soils as sources of topsoil for use on embankment and cut slopes and in ditches of highways, to promote the growth of vegetation, are with respect to De Kalb County. In addition to being fertile, the topsoil material should not contain stones or large gravel particles.

The cherty residuum of Clarksville and Fullerton soils, and the cherty substrata of Greendale, Minvale, Pace, and Ennis soils, contain gravelly materials that should be used in the foundation courses of pavements that are constructed in the vicinity of the source of the materials. Limited quantities of these materials may be suitable for use in the upper base course of flexible pavements on primary roads, or as surfacing for county roads; however, improvement of the gradation and plasticity characteristics of the natural materials by the addition of sand will usually be required. These cherty materials are not suitable for use in concrete structures.

The weathered conglomerate from which the Hartsells and limited percentages of other soils are derived may be suitable for use in base courses of pavements. The weathered sandstone may be used in foundation courses for pavements, or for blending with cherty materials that are used in base courses of pavements. The unweathered sandstone, conglomerate, and limestone may be quarried for use in base courses of pavements, and the crushed limestone may be used in bituminous and concrete pavements, as well as in other concrete structures. The usual tests for determination of quality must be made on these materials before their use is permitted in highway construction.

At many construction sites, major soil variations may occur within the depth of proposed excavation and several soil units may be encountered within a short distance. The soil maps and profile descriptions, as well as the engineering data and recommendations given in this section, should be used in planning detailed surveys of soils at construction sites. By using the information in the soil survey reports, the soils engineer can concentrate on the most suitable soil units. Then a minimum number of soil samples will be required for laboratory testing, and an adequate soil investigation can be made at minimum cost.

Soil Associations

Soils that occur together in a characteristic pattern make up a soil association. An association may consist of only a few or of many soils. The soils may be similar or may be of many different types. Although closely associated geographically, the soils in an association may differ in their suitability for agricultural use.

The boundaries of the seven soil associations in the county are shown on the colored soil association map in the back of the report. A description of each soil association follows.

Hartsells-Muskingum Association

The Hartsells-Muskingum is the most extensive soil association in De Kalb County. It occupies more than half of the county and occurs on the plateau areas of Sand and Lookout Mountains. The parent rock is mainly sandstone and conglomerate, interbedded in places with acid shale. The surface is predominantly undulating to rolling in all places except the narrow steep strips along the larger drains. Runoff for the extensive smooth areas is medium, but on the narrow steeper slopes along the drains it is rapid to very rapid. The soils are generally well drained to somewhat excessively drained.

The Hartsells soils, by far the most extensive in this association, occupy much of the undulating and rolling upland. Their depth to sandstone bedrock ranges from shallow to deep. The Muskingum soils occupy the steeper slopes along the draws and are very shallow to deep over sandstone bedrock. The Apison soils are on the less extensive undulating and rolling areas over shaly material. The narrow strips of recent colluvium and local alluvium along the drains give rise to Cotaco and Barbourville soils. The Lickdale soil occupies upland flats, depressions, and places around drainage heads. That part of the association on Lookout Mountain has somewhat less extensive areas of the deeper Hartsells soils and generally less depth to bedrock than elsewhere.

A great part of this soil association has been cleared and is used for crops or pasture. A very large part of the acreage of the Hartsells soils on Sand Mountain has been cleared. Some of the Muskingum soils have been cleared for pasture. Cotton and corn are the chief crops grown on this association. The extensive tillable acreage in this association is rather sandy, low in fertility, and acid. This association is in one of the most productive agricultural areas of Alabama and, in general, it is managed at a comparatively high level, as compared with soils in the rest of the State.

Apison-Pottsville-Muskingum Association

The Apison-Pottsville-Muskingum association occupies the more extensive parts of Sand Mountain and Lookout Mountain. These areas are underlain by shaly material. The soils of the Apison series occupy the

smoother parts of the association and are 1 to 3½ feet deep to partly disintegrated shale. Muskingum and Pottsville soils occupy the few steep slopes along the drains.

This association is much less extensive than the Hartsells-Muskingum association and occurs in rather small widely distributed areas. The dominant soils have a firmer, finer textured subsoil than the Hartsells soils and are somewhat shallower to bedrock. The surface relief, for the most part, is undulating to rolling; a few small areas are hilly. Runoff is medium to rapid, and the soils are moderately well drained to somewhat excessively drained.

Much of this association has been cleared. The remaining forested areas are usually on the stronger slopes. The soils of this association, like those of the Hartsells-Muskingum, are low in fertility and are acid.

Crossville-Muskingum-Hartsells Association

The Crossville-Muskingum-Hartsells association consists chiefly of Crossville soils. It also includes small areas of Hartsells soils and narrow strips of hilly and steep Muskingum soils along the larger drains. Except on the Muskingum soils, the slopes range from undulating to rolling. The Crossville soils are brown, permeable, and somewhat more fertile than the Hartsells soils. On an average they are shallower to bedrock. Their internal drainage is somewhat poorer or less adequate than that of the Hartsells soils, and seepage is common.

This fairly large association is much less extensive than the Hartsells-Muskingum and the Apison-Pottsville-Muskingum associations. Much of the acreage is on Lookout Mountain, but a few small areas are on Sand Mountain.

Probably more than half of the total area of this association has been cleared and is used chiefly for corn, cotton, soybeans, and hay crops. This association has a smaller proportion of cleared land than the Hartsells-Muskingum association, and in general it probably is not farmed so efficiently. Much of the Muskingum soil and areas of the Hartsells and Crossville soils are in cutover forests of oak and pine.

Muskingum-Rockland-Hartsells Association

The Muskingum-Rockland-Hartsells association occupies the rougher parts of Sand and Lookout Mountains. It consists predominantly of steep to very steep slopes occupied by the thin Muskingum soils and Rockland, sandstone, steep. The Hartsells soils are confined to narrow ridgetops. They are, for the most part, rolling and less than 24 inches thick over bedrock. The upper slopes of the Rockland consist almost wholly of sandstone material, but the lower slopes, especially those adjacent to the limestone valleys, are Rockland, limestone, steep.

Most of this moderately extensive association is in cutover deciduous forest. The cleared areas are chiefly on the narrow ridges occupied by Hartsells soils and by the less stony and less steep Muskingum soils adjacent to the ridgetops. In general, this association is best used for forest.

Clarksville-Fullerton-Litz Association

The Clarksville-Fullerton-Litz is the largest soil association in the limestone valleys. It consists chiefly of hilly and steep chert ridges, with narrow strips of shale on the slopes. The shale is exposed on the northwestern slope of the eastern chert ridge and on the southeastern slope of the western chert ridge. Clarksville and Fullerton soils dominate on the chert ridges, and Litz soils on the shale slopes.

The Fullerton and Clarksville soils are very deep to bedrock, but they are very cherty in most places. The chertiness, together with the strong slope and low fertility, makes these soils poorly suited to crops, except on the smoother parts. The Litz soils, chiefly because of their strong slopes and shallow depth to bedrock, are not well suited to tillage. If fertilizer is applied in large amounts, the tillable areas are suited to cotton, corn, and certain grasses and legumes for hay and for pasture. The only areas suited to intensive cultivation are the narrow strips of the less cherty soils along the drainageways. A large part of the association is in forest.

Colbert-Tupelo-Etowah Association

The Colbert-Tupelo-Etowah association occupies the nearly level to undulating floor of the limestone valley that lies between the two chert ridges. In general, this area is a strip from ⅓ to 1 mile wide that extends from the southern boundary of the county northeastward along Big Wills Creek to the Alabama-Georgia State line east of Sulphur Springs.

Many kinds of soils make up this association, but in general internal drainage is somewhat slow in all of them. All the soils are rather fine textured, and the surface soil in most places is silt loam, silty clay loam, or silty clay. Moderately well drained and rather fertile silt loam soil dominates on the bottom lands along the creek. There are some undulating well-drained fertile soils, including Etowah silt loam, eroded undulating phase. Much of the association, other than the bottom lands, however, is occupied by silty clay loam to silty clay soils that are shallow to bedrock and somewhat impaired in drainage. A considerable acreage of Stony smooth land, Talbott and Colbert soil materials, and Stony rolling land, Talbott and Colbert soil materials, is in this association. None of the stony land is suitable for cultivation, but some of it makes good pasture.

More than 50 percent of this association has been cleared and is used for crops or pasture. Much of the acreage is better suited to grasses and legumes than to crops that require permeable soils.

Allen-Hermitage Association

The Allen-Hermitage association is one of the most extensive in the county. It is confined chiefly to two narrow strips. One is directly below the northwest-facing escarpment of Lookout Mountain, and the other is directly below the southeast-facing escarpment of Sand Mountain. That part of the association along the base of Sand Mountain is somewhat more sandy than that below Lookout Mountain, and it is much more

eroded. Some of the area directly below Lookout Mountain contains rock fragments that interfere with field operations.

This association generally consists of red, moderately deep, friable soils derived from colluvium that sloughed from the adjacent steep slopes. Much of the acreage is well drained, and the slopes range from undulating to hilly. Narrow strips of first-bottom land occur along the drainageways that lead from the steep escarpment slopes to the broader bottom land below the strips of this association. The proportion of bottom land, however, is small.

A large part of this association has been cleared and is used for crops and pasture. It is well suited to many kinds of crops, including cotton, corn, soybeans, and legumes and grasses for hay and pasture. Under good management much of the association is well suited to winter legumes for green manure or grazing.

Much of the severely eroded acreage in the strip below Sand Mountain has low productivity or is idle. Exceptionally good management would be required to make this area suitable for cultivated crops.

Glossary

Acidity. The degree of acidity or alkalinity of a soil mass technically expressed in pH values, or in words, as follows (*5*):

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6–7.3
Very strongly acid	4.5–5.0	Mildly alkaline	7.4–7.8
Strongly acid	5.1–5.5	Moderately alkaline	7.9 8.4
Medium acid	5.6–6.0	Strongly alkaline	8.5–9.0
Slightly acid	6.1–6.5	Very strongly alkaline	9.1 and higher

Alluvium. Sand, mud, and other sediments deposited on land by streams.

Bedrock. The solid rock underlying soils.

Clay. Mineral soil particles less than 0.002 mm. (0.000079 in.) in diameter. (Formerly included particles less than 0.005 mm. in diameter.)

Claypan. A layer or horizon of accumulation, or a stratum of stiff, compact, and relatively impervious clay.

Colluvium. Deposits of rock fragments and soil material near the base of slopes. The materials have been moved by gravity, frost action, soil creep, and local wash. In many areas colluvium is of mixed character.

Consistence, soil. The attributes of soil material that are expressed by degree and kind of cohesion and adhesion or by the resistance to deformation or rupture. Every soil material has consistence irrespective of whether the mass be large or small, in a natural condition or greatly disturbed, aggregated or structureless, moist or dry. Terms commonly used are compact, firm, friable, hard, plastic, and sticky.

COMPACT. Dense and firm but without any cementation.

FIRM. Soil material crushes under moderate pressure between thumb and forefinger but resistance is distinctly noticeable.

FRIABLE. Soil material crushes easily under gentle to moderate pressure between thumb and forefinger, and coheres when pressed together.

HARD. Moderately resistant to pressure; can be broken in the hands without difficulty but is barely breakable between thumb and forefinger.

PLASTIC. Soil material forms wirelike shape when rolled between thumb and forefinger, and moderate pressure is required to deform the soil mass.

STICKY. After pressure, soil material adheres to both thumb and forefinger and tends to stretch somewhat and pull apart rather than to pull free from either digit.

Contour tillage. Furrows plowed at right angles to the direction of slope, at the same level throughout, and ordinarily at reasonably close intervals.

Cropland. Land regularly used for crops, except forest crops. It includes rotation pasture, cultivated summer fallow, or land that is temporarily idle.

Crumb (*See also* Structure, type). Generally soft, small, porous aggregates, tending toward a spherical shape, as in the A_1 horizons of many soils. This variety is closely related to granular structure.

Drainage, soil. The rapidity and extent of the removal of water from the soil, in relation to additions, especially by runoff, by flow through the soil to underground spaces, or by a combination of both processes. As a condition of the soil, soil drainage refers to the frequency and duration of periods when the soil is free of saturation or partial saturation. The following terms are defined: runoff, internal drainage, soil permeability, and soil drainage classes.

RUNOFF: The amount of water removed by flow over the surface of the soil. The amount and rapidity of runoff is closely related to slope and is also affected by factors such as texture, structure, and porosity of the surface soil; the vegetative covering; and the prevailing climate. Relative degrees of runoff are as follows:

Ponded: None of the water added to the soil as precipitation or by flow from surrounding higher land escapes as runoff. Removal is by movement through the soil or by evaporation.

Very slow: Surface water flows away so slowly that free water lies on the surface for long periods or enters immediately into the soil. Very little of the water is removed by runoff.

Slow: Surface water flows away so slowly that free water covers the soil for significant periods or enters the soil so rapidly that only a small amount is removed as runoff. Normally, there is little or no erosion hazard.

Medium: Surface water flows away at such a rate that a moderate proportion of the water enters the soil profile and free water lies on the surface for only short periods. The loss of water over the surface does not reduce seriously the supply available for plant growth. This commonly is considered good external drainage. The erosion hazard may be slight to moderate if soils of this class are cultivated.

Rapid: A large proportion of the precipitation moves rapidly over the surface of the soil and a small part moves through the soil profile. The erosion hazard commonly is moderate to high.

Very rapid: A very large part of the water moves rapidly over the surface of the soil and a very small part goes through the profile. The erosion hazard is commonly high or very high.

INTERNAL DRAINAGE: That quality of a soil that permits the downward flow of excess water through it. It is reflected in the frequency and duration of periods of saturation. It is determined by the texture, structure, and other characteristics of the soil profile and of underlying layers and by the height of the water table, either permanent or perched, in relation to the water added to the soil. Relative terms for expressing internal drainage are as follows:

None: No free water passes through the soil mass.

Very slow: The rate of internal drainage is much too slow for optimum growth of important crops (not water-tolerant or water-loving crops) in humid regions.

Slow: The rate of movement of water through the soil is not so fast as in medium drainage but faster than in very slow drainage.

Medium: Internal drainage is about optimum for growth of important crops under humid conditions. Medium is considered good internal drainage.

Rapid: Internal drainage is somewhat too rapid for the optimum growth of the important crops of the region.

Very rapid: The rate of movement of water through the profile is very rapid. Internal drainage is too rapid for optimum growth of most of the important crops of the region.

SOIL PERMEABILITY: That quality of the soil that enables it to transmit water and air. Rates of percolation are expressed in inches per hour. Relative classes of soil permeability are very slow, slow, moderately slow, moderate, moderately rapid, rapid, and very rapid.

SOIL DRAINAGE CLASSES: Relative terms for expressing soil drainage classes are as follows:

Very poorly drained: Water is removed from the soil so slowly that the water table remains at or on the surface the greater part of the time.

Poorly drained: Water is removed so slowly that the soil remains wet for a large part of the time. The water table is commonly at or near the surface during a considerable part of the year.

Imperfectly or somewhat poorly drained: Water is removed from the soil slowly enough to keep it wet for significant periods, but not all of the time.

Moderately well drained: Water is removed from the soil somewhat slowly, so that the profile is wet for a small but significant part of the time.

Well drained: Water is removed from the soil readily, but not rapidly. A well-drained soil has good drainage.

Somewhat excessively drained: Water is removed from the soil rapidly so that only a relatively small part is available to plants. Only a narrow range of crops can be grown on these soils, and yields are usually low without irrigation.

Excessively drained: Water is removed from the soil very rapidly. Excessively drained soils commonly are shallow to bedrock and may be steep, very porous, or both. Enough precipitation commonly is lost from these soils to make them unsuitable for ordinary crop production.

Erosion. The wearing away of the land surface by detachment and transport of soils and rock materials through the action of moving water, wind, and other geological agents. The classification followed in defining, naming, and mapping the erosion is expressed in terms as follows: Slightly eroded, moderately eroded, severely eroded, and gullied land.

SLIGHTLY ERODED: Soil mapped without indicating erosion, as Capshaw silt loam. Such soil may have lost as much as 25 percent of the original surface soil, but the plow layer consists almost entirely of surface soil.

MODERATELY ERODED: Soil eroded to the extent that the subsoil material is within plow depth over about half or more of the delineated area. Ordinary tillage will bring part of the upper subsoil to the surface and alter the original surface soil with an admixture of subsoil material. About 25 to 75 percent of the original surface soil may have been lost. Shallow gullies may be present.

SEVERELY ERODED: Soil eroded to the extent that all or practically all of the original surface soil has been lost. Tillage is almost entirely in subsoil material. Short shallow gullies are common, and a few gullies may be too deep to be obliterated by ordinary tillage.

GULLIED LAND: Areas of soil eroded to the extent that the processes for reclaiming them would be very slow. The areas consist of an intricate pattern of gullies; the soil profile over most of such area has been largely mutilated.

Fertility, soil. The inherent quality of a soil as measured by the quantity of compounds provided for proper or balanced growth of plants.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Forest. Land not in farms, bearing a stand of trees of any age or size, including seedlings, and species that attain a minimum average height of 6 feet at maturity; or land from which such a stand has been removed, but which has been put to no other use. Forest on farms is commonly called woodland or farm forests.

Granular. (*See also* Structure, type). Roughly spherical aggregates that may be either hard or soft, usually more firm than crumb and without the distinct faces of blocky structure.

Green-manure crop. Any crop grown and plowed under while green for the purpose of improving the soil.

Leaching, soil. The removal of materials in solution by percolating water.

Massive (*See also* Structure, grade). Large uniform masses of cohesive soil, sometimes with ill-defined and irregular breakage, as in some of the fine-textured alluvial soils; structureless.

Mottled. Marked with spots of color and usually associated with poor drainage. Descriptive terms for mottles follow: Contrast—faint, distinct, and prominent; abundance—few, common, and many; and size—fine, medium, and coarse. The size measurements are as follows: Fine, commonly less than 5 mm. (about 0.2 in.) in diameter along the greatest dimension; medium, commonly ranging between 5 and 15 mm. (about 0.2 to 0.6 in.) along the greatest dimension; and coarse, commonly more than 15 mm. (about 0.6 in.) along the greatest dimension (*4*).

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in elaboration of its food and tissue. Essential nutrients include nitrogen, phosphorus, calcium, potassium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and other elements mainly from the soil; and carbon, hydrogen, and oxygen, largely from the air and water.

Parent material. The unconsolidated mass of rock material (or peat) from which the soil profile develops.

Permeable. Easily penetrated, as by water or air.

Productivity, soil. The present capability of a soil to produce a specified plant or sequence of plants under a defined set of management.

Profile, soil. A vertical section of the soil, from the surface into the parent material.

Reaction, soil. (*See* Acidity.)

Relief. Elevations or inequalities of the land surface, the slope gradient, and the pattern of these, considered collectively.

Sand. Rock or mineral fragments having diameters ranging between 0.05 mm. (0.002 in.) and 2.0 mm. (0.08 in.). The term sand is also applied to soils containing 85 percent or more of sand; percentage of silt, plus 1½ times the percentage of clay shall not exceed 15.

Silt. Mineral soil grains ranging from 0.05 mm. (0.002 in.) to 0.002 mm. (0.000079 in.) in diameter.

Soil. Natural body on the surface of the earth characterized by conformable layers resulting from modification or parent material by physical, chemical, and biological forces over periods of time.

Soil separates. The individual size groups of soil particles, as sand, silt, and clay.

Stripcropping. The practice of growing ordinary farm crops in long strips or bands of variable widths across the line of slope, or approximately on the contour. Close-growing crops are seeded in alternate strips with clean-tilled crops.

Structure, soil. The aggregation of primary soil particles into compound particles, or clusters of primary particles, which are separated from adjoining aggregates by surfaces of weakness. Soil structure is classified according to grade, class, and type.

GRADE: Degree of distinctness of aggregation. It expresses the differential between cohesion within aggregates and adhesion between aggregates. Terms: Structureless (single grain or massive), weak, moderate, and strong.

CLASS: Size of soil aggregates. Terms: Very fine or very thin, fine or thin, medium, coarse or thick, and very coarse or very thick.

TYPE: Shape and arrangement of individual natural soil aggregates. Terms: Platy, prismatic, columnar, blocky, subangular blocky, granular, and crumb. (Example of soil-structure grade, class, and type: Moderate coarse subangular blocky). Principal structure types in this county are the blocky and crumb. Fine blocky structure peds (aggregates or units) are 5 to 10 mm. (0.2 to 0.4 inch) in size; medium subangular blocky, 10 to 20 mm. (0.4 to 0.8 inch); and coarse subangular blocky, 20 to 50 mm. (0.8 to 2.0 inches). Fine crumb structure peds are 1 to 2 mm. (0.04 to 0.08 inch) in size, and medium crumb structure peds are 2 to 5 mm. (0.08 to 0.2 inch).

Subsoil. Roughly, that part of the profile below plow depth.

Surface soil. That part of the upper profile usually stirred by plowing.

Terrace (for control of runoff, erosion, or both). An embankment or ridge constructed across sloping soils, on or approximately on contour lines, at specific intervals. The terrace intercepts surplus runoff in order to retard it for infiltration into the soil or to direct any excess flow to an outlet at nonerosive velocity.

Texture. Refers to the relative proportions of the various size groups of individual soil grains in a mass of soil. Specifically, it refers to the proportions of clay, silt, and sand below 2 millimeters in diameter. A coarse-textured soil is one high in content of sand; a fine-textured soil has a large proportion of clay.

Workability, soil. Refers to the ease of performing tillage, harvesting, and other farming operations on the soil. Texture, structure, consistence, content of organic matter, moisture, stoniness, and slope are major characteristics that affect workability. Workability is expressed in six descriptive terms:

EXCELLENT: Soils of excellent workability are generally light- to medium-textured, stone-free, and nearly level. They require the minimum of effort for tillage and harvesting, and all kinds of farm machinery can be used on them.

VERY GOOD: Soils having very good workability may have such features as fine texture, small quantities of rock fragments, or somewhat uneven but mild slopes, which makes the use of farm machinery somewhat more difficult than on soils having excellent workability. All common types of farm machinery can be used on them, however.

GOOD: A soil with good workability is suited to the use of all common types of farm machinery, but more effort is required to obtain their greatest efficiency than on soils of very good workability.

FAIR: Soils of fair workability are poorly suited to the use of heavy farm machinery. Normal farming operations are more difficult than on soils of good workability.

POOR: Silty clay or clay soils, hilly soils, or soils that contain enough chert or gravel to interfere seriously with tillage are classified as having poor workability. The use of all types of farm machinery is almost precluded.

VERY POOR: Soils with very poor workability are so steep, cherty, or both, that tillage is generally done with hand implements.

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Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

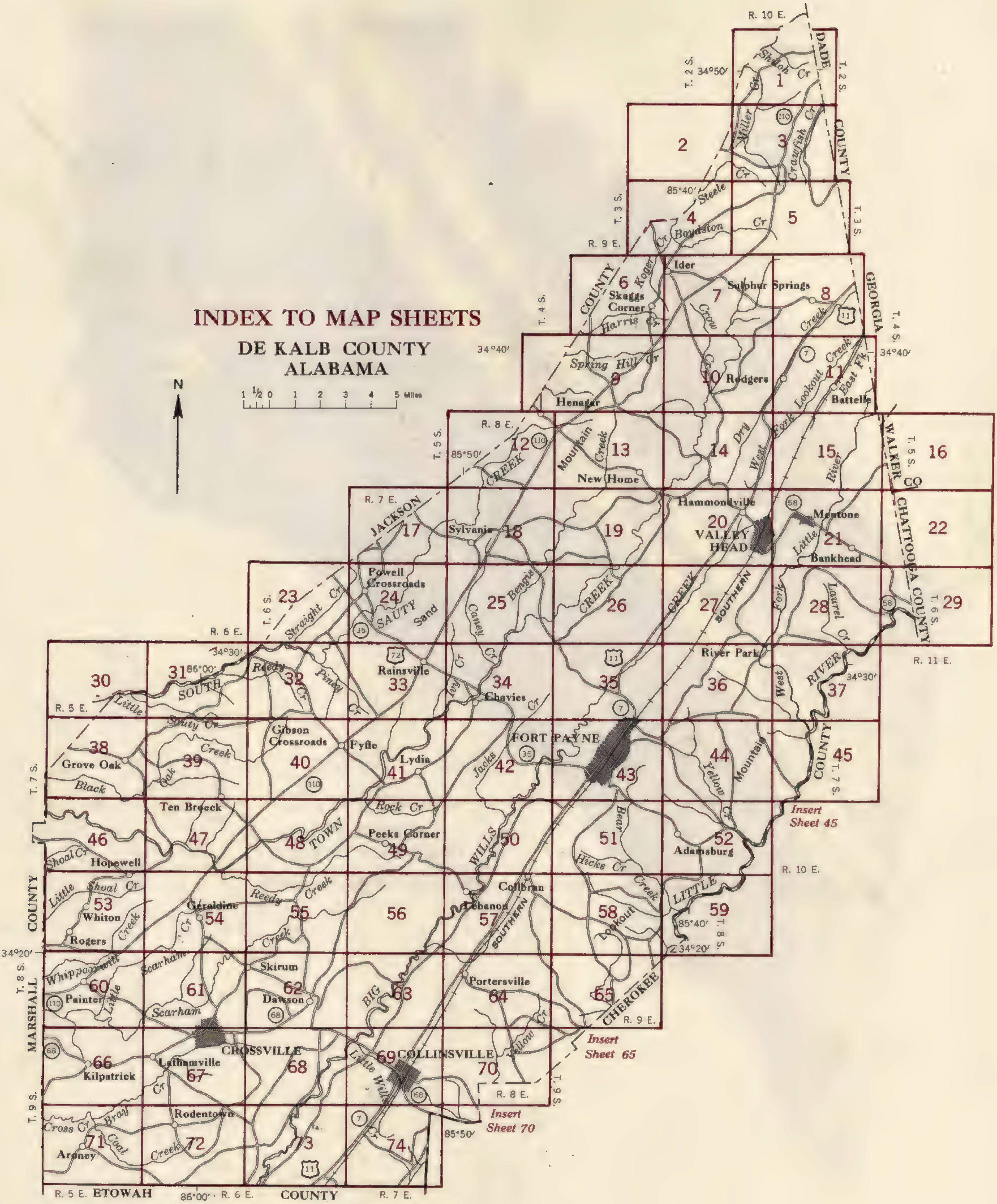
All Other Inquiries

For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).


SOIL ASSOCIATION
DE KALB COUNTY
ALABAMA
1 1/2 0 1 2 3 4 5 Miles
N
LEGEND
1 Hartsells-Muskingum
2 Apison-Pottsville-Muskingum
3 Crossville-Muskingum-Hartsells
4 Muskingum-Rockland-Hartsells
5 Clarksville-Fullerton-Litz
6 Colbert-Tupelo-Etowah
7 Allen-Hermitage
FORT PAYNE
VALLEY HEAD
COLLINSVILLE
CROSSVILLE
Rainsville
Fyffe
JACKSON COUNTY
DADE COUNTY
GEORGIA
WALKER CO
CHATTOOGA COUNTY
CHEROKEE COUNTY
ETOWAH COUNTY
MARSHALL COUNTY

INDEX TO MAP SHEETS

DE KALB COUNTY ALABAMA



SOILS LEGEND

SYMBOL	NAME
Aa	Abernathy silt loam
Ab	Allen clay loam, severely eroded hilly phase
Ac	Allen clay loam, severely eroded rolling phase
Ad	Allen loam, eroded hilly phase
Ae	Allen loam, eroded rolling phase
Af	Allen loam, eroded undulating phase
Ag	Allen loam, hilly phase
Ah	Allen stony clay loam, severely eroded hilly phase
Ak	Allen stony loam, eroded rolling phase
Al	Allen stony loam, hilly phase
Am	Apison loam, eroded rolling phase
An	Apison loam, eroded undulating phase
Ao	Apison loam, rolling phase
Ap	Apison loam, undulating phase
Au	Atkins silt loam
Ca	Capshaw silt loam
Cb	Clarksville cherty silt loam, eroded hilly phase
Cc	Clarksville cherty silt loam, eroded rolling phase
Cd	Clarksville cherty silt loam, hilly phase
Ce	Clarksville cherty silt loam, rolling phase
Cf	Clarksville cherty silt loam, steep phase
Cg	Clarksville cherty silty clay loam, severely eroded steep phase
Ch	Colbert silty clay, eroded rolling phase
Ck	Colbert silty clay loam, eroded undulating phase
Cl	Cotaco-Barbourville loams
Cm	Crossville loam, rolling phase
Cn	Crossville loam, undulating phase
Co	Crossville rocky loam, rolling phase
Cp	Crossville rocky loam, undulating phase
Da	Dewey silty clay loam, eroded hilly phase
Db	Dewey silty clay loam, eroded rolling phase
Dc	Dunning silty clay
Dd	Dowellton silty clay loam
Ea	Ennis cherty silt loam
Eb	Ennis silt loam
Ec	Etowah silt loam, eroded undulating phase
Fa	Fullerton cherty silt loam, eroded hilly phase
Fb	Fullerton cherty silt loam, eroded rolling phase
Fc	Fullerton cherty silt loam, hilly phase
Fd	Fullerton cherty silt loam, rolling phase
Fe	Fullerton cherty silty clay loam, severely eroded hilly phase

SYMBOL	NAME
Ga	Greendale cherty silt loam
Gb	Gullied land
Ha	Hamblen loam, local alluvium phase
Hb	Hartsells fine sandy loam, eroded rolling phase
Hc	Hartsells fine sandy loam, eroded undulating phase
Hd	Hartsells fine sandy loam, eroded rolling shallow phase
He	Hartsells fine sandy loam, eroded undulating shallow phase
Hf	Hartsells fine sandy loam, rolling phase
Hg	Hartsells fine sandy loam, rolling shallow phase
Hh	Hartsells fine sandy loam, undulating phase
Hk	Hartsells fine sandy loam, undulating shallow phase
Hl	Hermitage silty clay loam, eroded rolling phase
Hm	Hermitage silty clay loam, eroded undulating phase
Hn	Hermitage silty clay loam, severely eroded rolling phase
Ho	Huntington fine sandy loam
Hp	Huntington silt loam
Ja	Jefferson loam, eroded rolling phase
Jb	Jefferson loam, eroded undulating phase
Jc	Johnsburg loam
La	Leadvale silt loam, eroded rolling phase
Lb	Leadvale silt loam, eroded undulating phase
Lc	Lickdale loam
Ld	Lindside silt loam
Le	Linker fine sandy loam, eroded rolling phase
Lf	Linker fine sandy loam, eroded undulating phase
Lg	Litz shaly silty clay loam, eroded hilly phase
Lh	Litz shaly silty clay loam, eroded rolling phase
Lk	Litz shaly silty clay loam, eroded steep phase
Ll	Litz silt loam, hilly phase
Lm	Litz silt loam, rolling phase
Ln	Litz silt loam, steep phase
Ma	Melvin silt loam
Mb	Minvale cherty silt loam, eroded rolling phase
Mc	Minvale cherty silt loam, eroded undulating phase
Md	Minvale cherty silt loam, rolling phase
Me	Minvale silt loam, eroded rolling phase
Mf	Minvale silt loam, eroded undulating phase
Mg	Muse silt loam, eroded rolling phase
Mh	Muse silt loam, eroded undulating phase
Mk	Muse silty clay loam, severely eroded rolling phase
Ml	Muskingum fine sandy loam, eroded hilly phase
Mm	Muskingum fine sandy loam, hilly phase
Mn	Muskingum stony fine sandy loam, hilly phase
Mo	Muskingum stony fine sandy loam, rolling phase

SYMBOL	NAME
Oa	Ooltewah silt loam
Pa	Pace cherty silt loam, eroded rolling phase
Pb	Pace cherty silt loam, eroded undulating phase
Pc	Pace cherty silt loam, rolling phase
Pd	Philo loam
Pe	Pope loam
Pf	Pottsville loam, hilly phase
Pg	Pottsville shaly loam, eroded hilly phase
Ra	Robertsville silt loam
Rb	Rockland, limestone, steep
Rc	Rockland, sandstone, rolling
Rd	Rockland, sandstone, steep
Sa	Sequatchie fine sandy loam, eroded undulating phase
Sb	Sequatchie fine sandy loam, undulating phase
Sc	Sequoia silty clay, severely eroded rolling phase
Sd	Staser loam, local alluvium phase
Se	Stony colluvial land, steep
Sf	Stony rolling land, Talbott and Colbert soil materials
Sg	Stony smooth land, Talbott and Colbert soil materials
Ta	Talbott silty clay, severely eroded hilly phase
Tb	Talbott silty clay, severely eroded rolling phase
Tc	Talbott silty clay loam, eroded rolling phase
Td	Talbott silty clay loam, eroded undulating phase
Te	Tellico clay loam, eroded rolling phase
Tf	Tellico clay loam, severely eroded hilly phase
Tg	Tellico clay loam, severely eroded steep phase
Th	Tellico loam, steep phase
Tk	Tupelo silt loam

Soils surveyed 1947-51 by G. A. Swenson and S. R. Bacon, U. S. Department of Agriculture, and R. S. Farnham and J. E. Paseur, Alabama Agricultural Experiment Station. Correlation by M. J. Edwards, U. S. Department of Agriculture.

Soil map constructed by Cartographic Division, Soil Conservation Service, USDA, from 1949 aerial photographs. Controlled mosaic based on polyconic projection, 1927 North American datum.

DE KALB COUNTY, ALABAMA
CONVENTIONAL SIGNS

WORKS AND STRUCTURES

- Roads
  - Good motor
  - Poor motor
  - Trail
  - Marker, U. S. — 33
- Railroads
  - Single track
  - Multiple track
  - Abandoned
- Bridges and crossings
  - Road
  - Trail, foot
  - Railroad
  - Ferry
  - Ford
  - Grade
  - R. R. over
  - R. R. under
  - Tunnel
- Buildings
  - School
  - Church
  - Station
- Mine and Quarry
  - Shaft
  - Dump
  - Prospect
- Pits, gravel or other
- Power line
- Pipeline
- Cemetery
- Dam
- Levee
- Tank
- Oil well
- Windmill
- Canal lock (point upstream)

BOUNDARIES

- National or state
- County
- Township, civil
  - U. S.
- Section
- City (corporate)
- Reservation
- Land grant

DRAINAGE

- Streams
  - Perennial
  - Intermittent, unclass.
    - Crossable with tillage implements
    - Not crossable with tillage implements
- Canals and ditches — CANAL / DITCH
- Lakes and ponds
  - Perennial
  - Intermittent
- Wells — flowing
- Springs
- Marsh
- Wet spot

RELIEF

- Escarpments
  - Bedrock
  - Other
- Prominent peaks
- Depressions (Large / Small)
  - Crossable with tillage implements
  - Not crossable with tillage implements
  - Contains water most of the time

SOIL SURVEY DATA

- Soil type outline and symbol — Dx
- Gravel
- Stones
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Erosion
  - Uneroded spot — U
  - Sheet, moderate — S
  - Sheet, severe — SS
  - Gully, moderate — G
  - Gully, severe — GG
  - Sheet and gully, moderate — SG
  - Wind, moderate
  - Wind, severe
  - Blowout
  - Wind hummock
  - Overblown soil
- Gullies
- Areas of alkali and salts
  - Strong — A
  - Moderate — M
  - Slight — S
  - Free of toxic effect — F
  - Sample location — 26
  - Saline spot

DE KALB COUNTY, ALABAMA

(Sheet 3)

2

N


PRECINCT 14
DEER HEAD COVE
PRECINCT 19
POPLAR SPRINGS
13
12
(Sheet 3)
T. 3 S.
R. 9 E.
(Sheet 4)
0
5 000 Feet

0 ½ 1 Mile

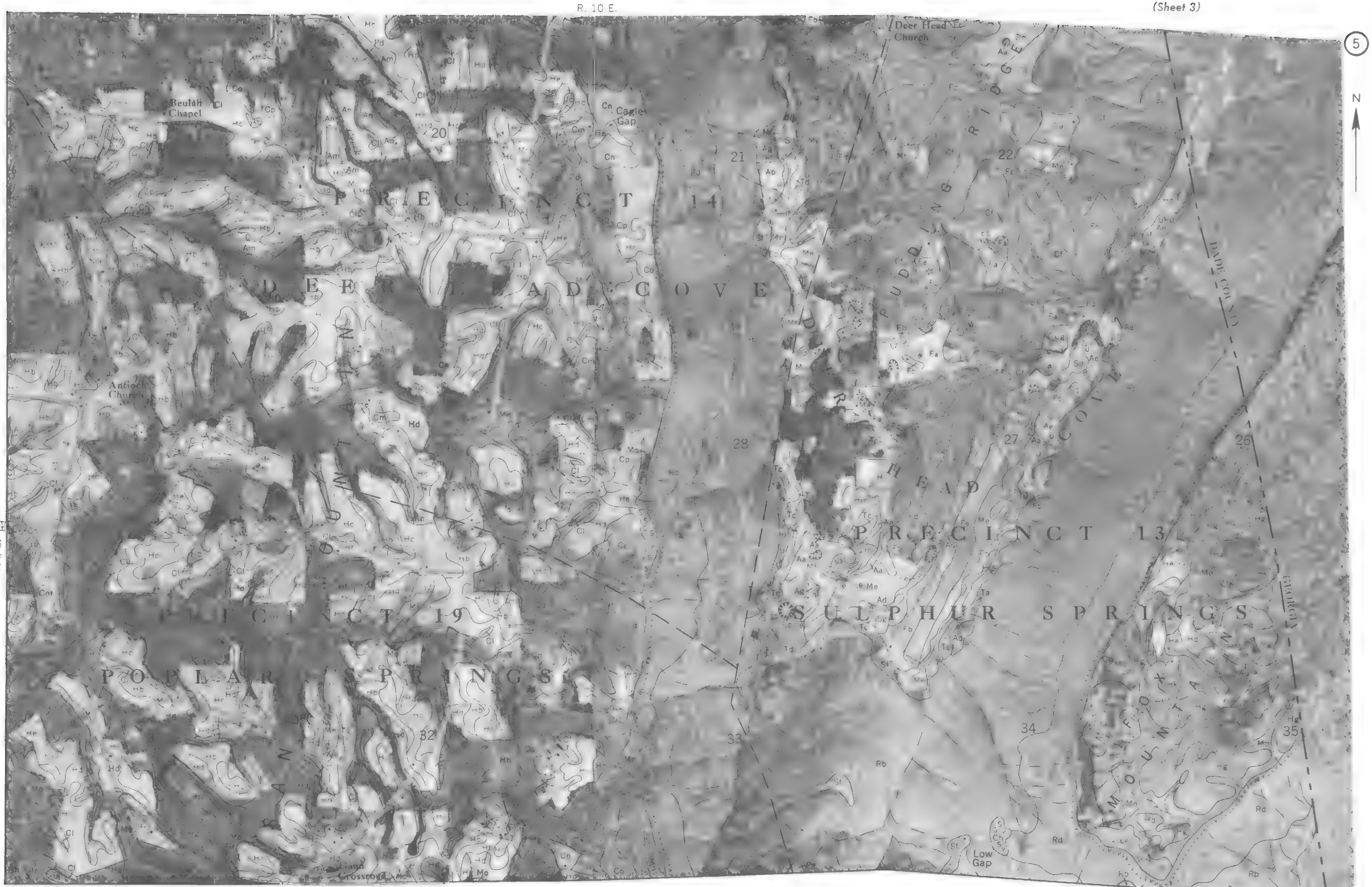
(Sheet 1)

(Sheet 5)


4
(Sheet 2)
R. 9 E.
N
(APPROXIMATE BOUNDARY)
JACKSON COUNTY
Weldon Church
Pilgrim Church
Mt Zion Church
PRECINCT 19
POPLAR SPRINGS
SAND MOUNTAIN
BOYDSTON BRIDGE
23
26
25
28
27
33
34
35
(Sheet 5)
T. 3 S.
(Sheet 6)
(Sheet 7)
0
1/2
1 Mile
0
5000 Feet

R. 10 E.

(Sheet 3)



(Sheet 7) | (Sheet 8)

0 1/2 1 Mile

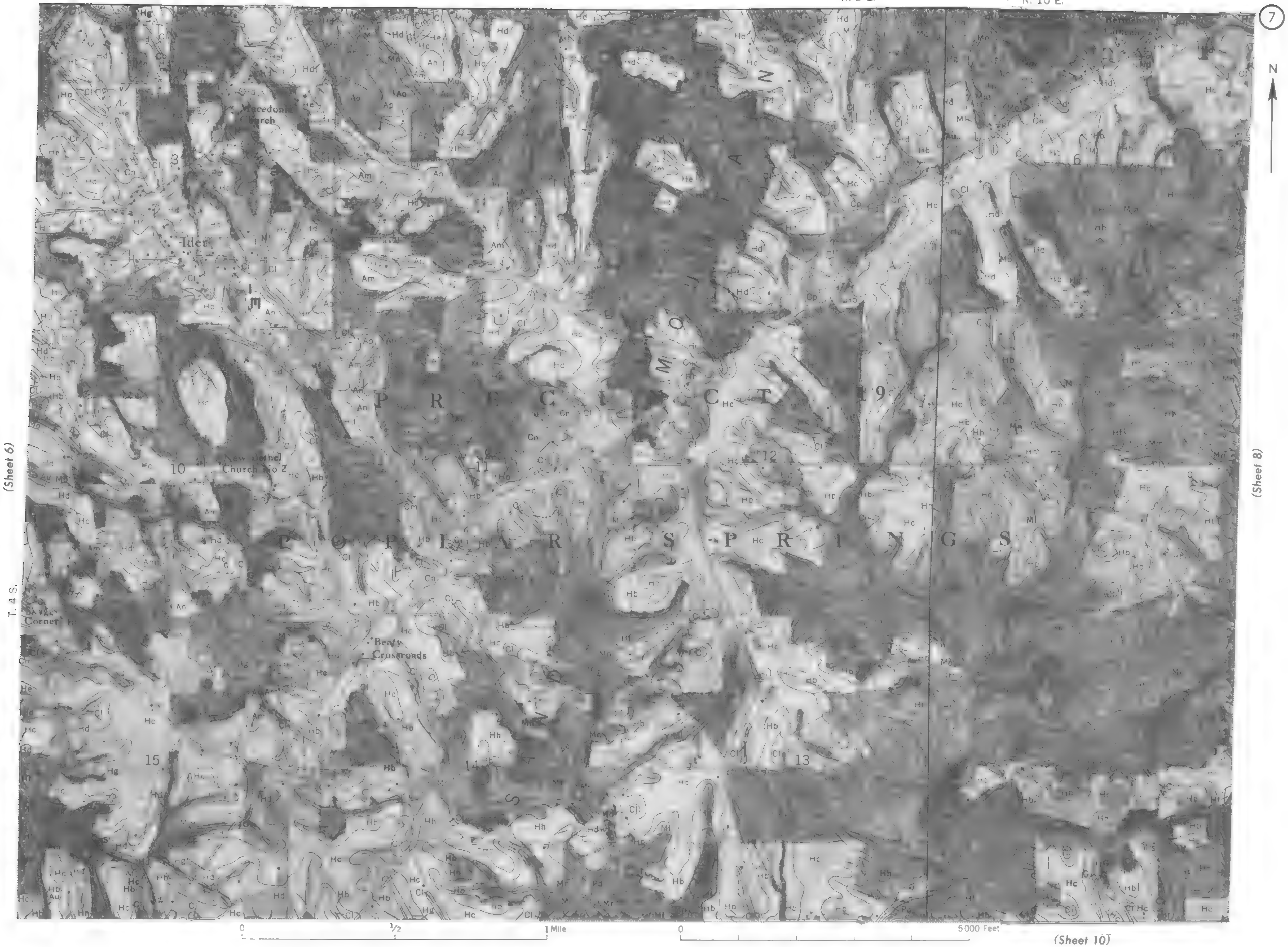
0 5000 Feet

6

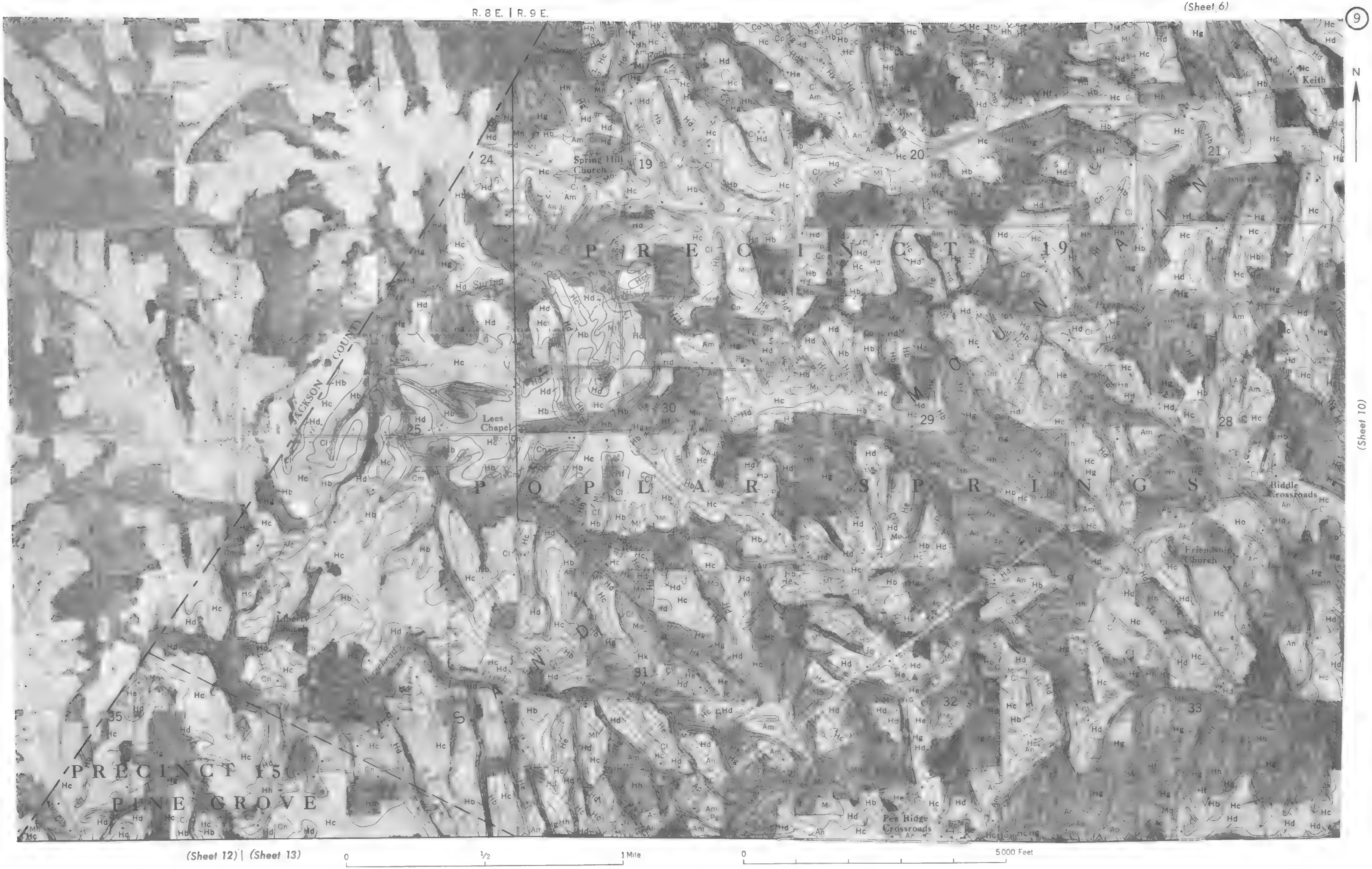
(Sheet 4)

R. 9 E.


N
JACKSON COUNTY
PRECINCT 19
POPLAR SPRINGS
SAND MOUNTAIN
4
5
8
9
16
17
(Sheet 7)
T. 4 S.
(Sheet 9)
0
1/2
1 Mile
0
5000 Feet


R. 9 E.
(Sheet 4)
(Sheet 5)
R. 10 E.
7
N
(Sheet 6)
(Sheet 8)
(Sheet 10)
T. 4 S.
Macedonia Church
Iden
New Bethel Church No 2
Skaggs Corner
Beaty Crossroads
P R E C I N C T
P O P L A R S P R I N G S
0
1/2
1 Mile
0
5000 Feet

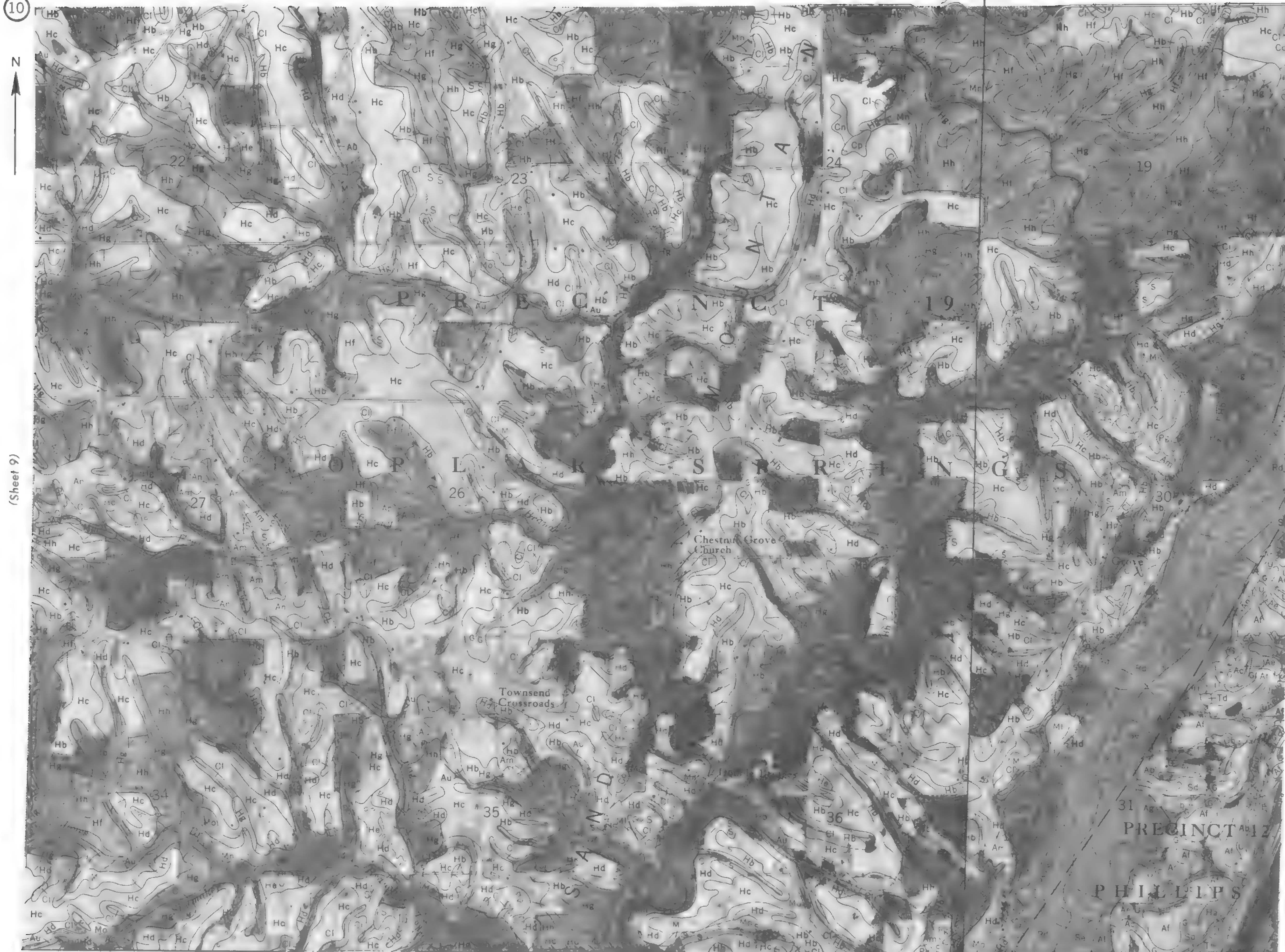

8
(Sheet 5)
R. 10 E.
N
(Sheet 7)
T. 4 S.
PRECINCT 19
POPLAR SPRINGS
PRECINCT 13
SULPHUR SPRINGS
SAND MOUNTAIN
BIG RIDGE
Sulphur Springs
Brown's Gap
State Line Church
DADE COUNTY
GEORGIA
(Sheet 11)
1 Mile
0
5000 Feet


R. 8 E. | R. 9 E.
(Sheet 6)
9
N
Spring Hill Church
Keith
PRECINCT 19
MOUNTAIN
Lees Chapel
JACKSON COUNTY
POPLAR SPRINGS
Biddle Crossroads
Friendship Church
SAND
PRECINCT 15
PINE GROVE
Pea Ridge Crossroads
(Sheet 10)
(Sheet 12) | (Sheet 13)
0
1/2
1 Mile
0
5000 Feet

(Sheet 7)

10

R. 9 E. | R. 10 E.



(Sheet 9)

(Sheet 11)

(Sheet 14)

1 Mile

5000 Feet


R. 10 E.
(Sheet 8)
11
N
PRECINCT 19
POPLAR SPRINGS
PRECINCT 13
SULPHUR SPRINGS
PRECINCT 12
PHILLIPS
PRECINCT 21
MENTONE
HARTLINE CEMETERY
Rodgers
Harmony Grove Church
Eagle Cliff
Battelle
DADE COUNTY
GEORGIA
T. 4 S.
(Sheet 10)
(Sheet 15)
(Sheet 16)
5000 Feet

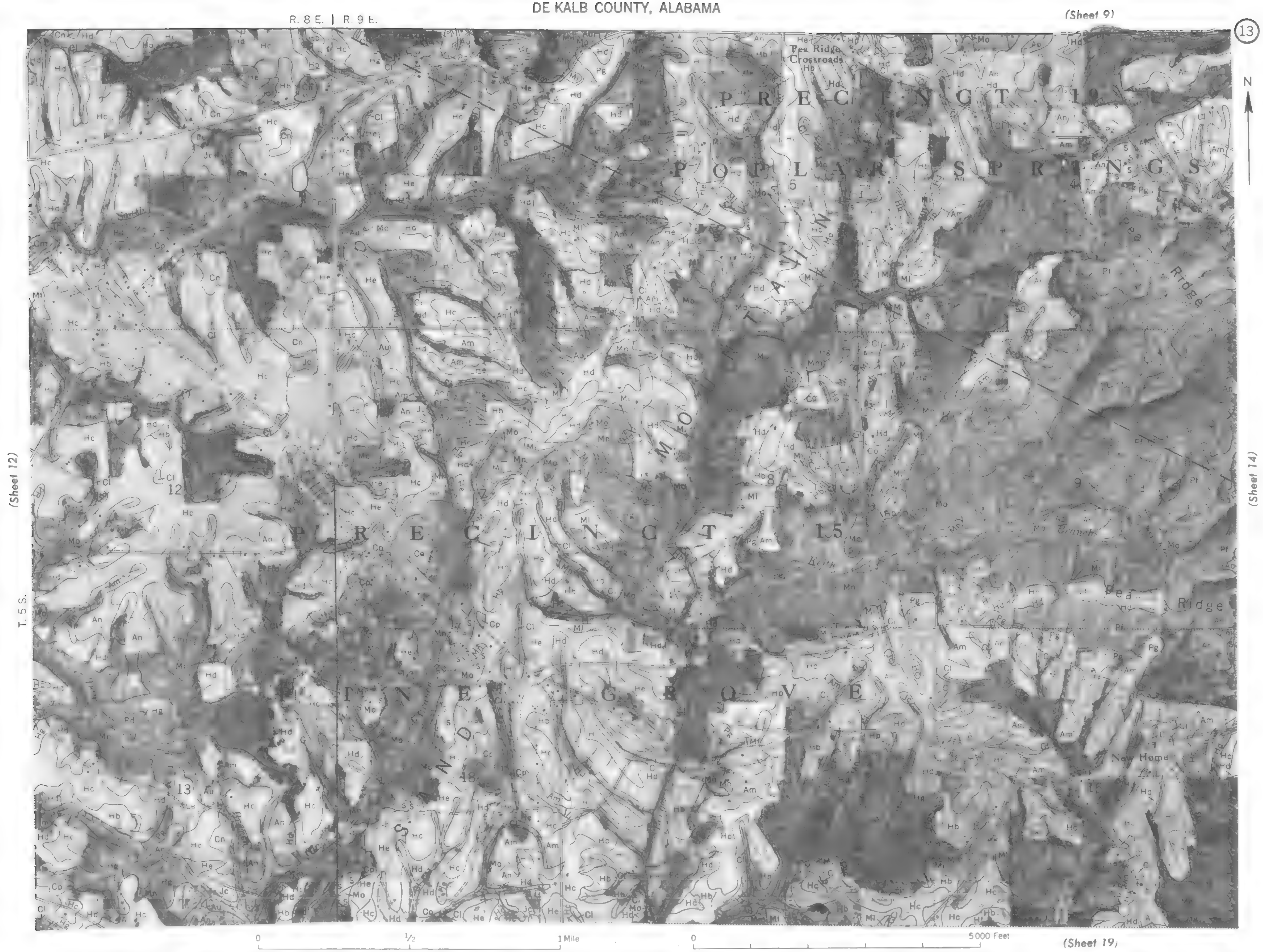
12

(Sheet 9)

(Sheet 18)

0 ½ 1 Mile

0 5000 Feet


R. 8 E. | R. 9 E.
(Sheet 9)
13
N
Pea Ridge Crossroads
PRECINCT 10
POPLAR SPRINGS
SAND MOUNTAIN
PRECINCT 15
PINE GROVE
Pea Ridge
Pea Ridge
New Home
(Sheet 12)
(Sheet 14)
T. 5 S.
(Sheet 19)
0
1/2
1 Mile
0
5000 Feet

14

(Sheet 10)

R. 9 E. | R. 10 E.

N

(Sheet 13)

(Sheet 15)

T. 5 S.

(Sheet 20)

½ 1 Mile 0 5000 Feet

R. 10 E.

15

(Sheet 14)

T. 5 S.

(Sheet 16)

½ 1 Mile 0 5000 Feet

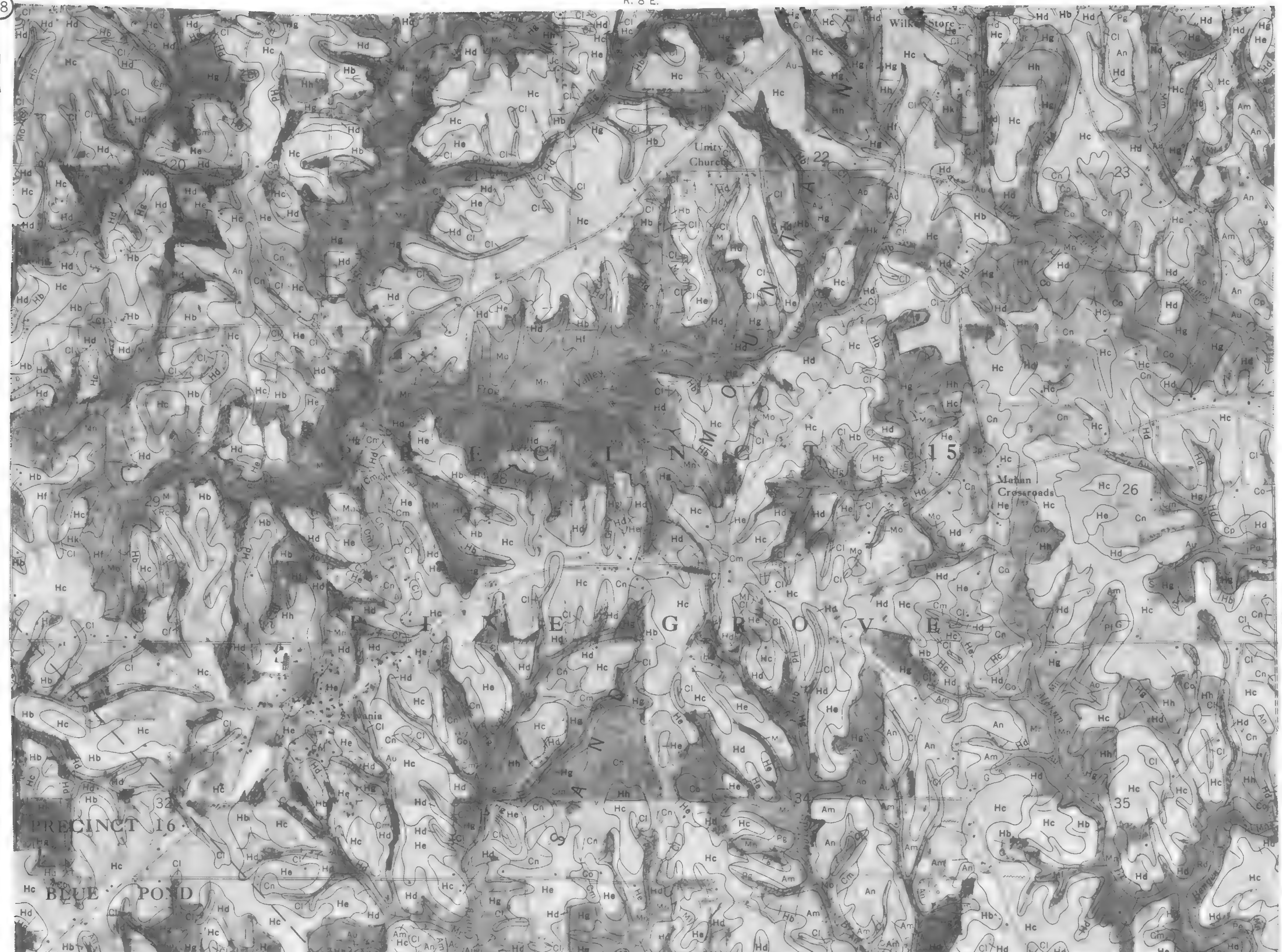

16
R. 10 E.
(Sheet 11)
N
DADE COUNTY
GEORGIA
PRECINCT 21
MENTONE
WALKER COUNTY
GEORGIA
LOOKOUT MOUNTAIN
12
13
1
(Sheet 15)
T. 5 S.
(Sheet 22)
0
1/2
1 Mile
0
5 000 Feet

R. 7 E. | R. 8 E.
17
N
T. 5 S.
(Sheet 18)
(Sheet 24)
JACKSON COUNTY
PRECINCT 15
PINE GROVE
SAND MOUNTAIN
PRECINCT 16
BLUE POND
New Bethel Church
19
25
26
30
34
35
36
31
0
½
1 Mile
5000 Feet

(18)

(Sheet 12)

R. 8 E.

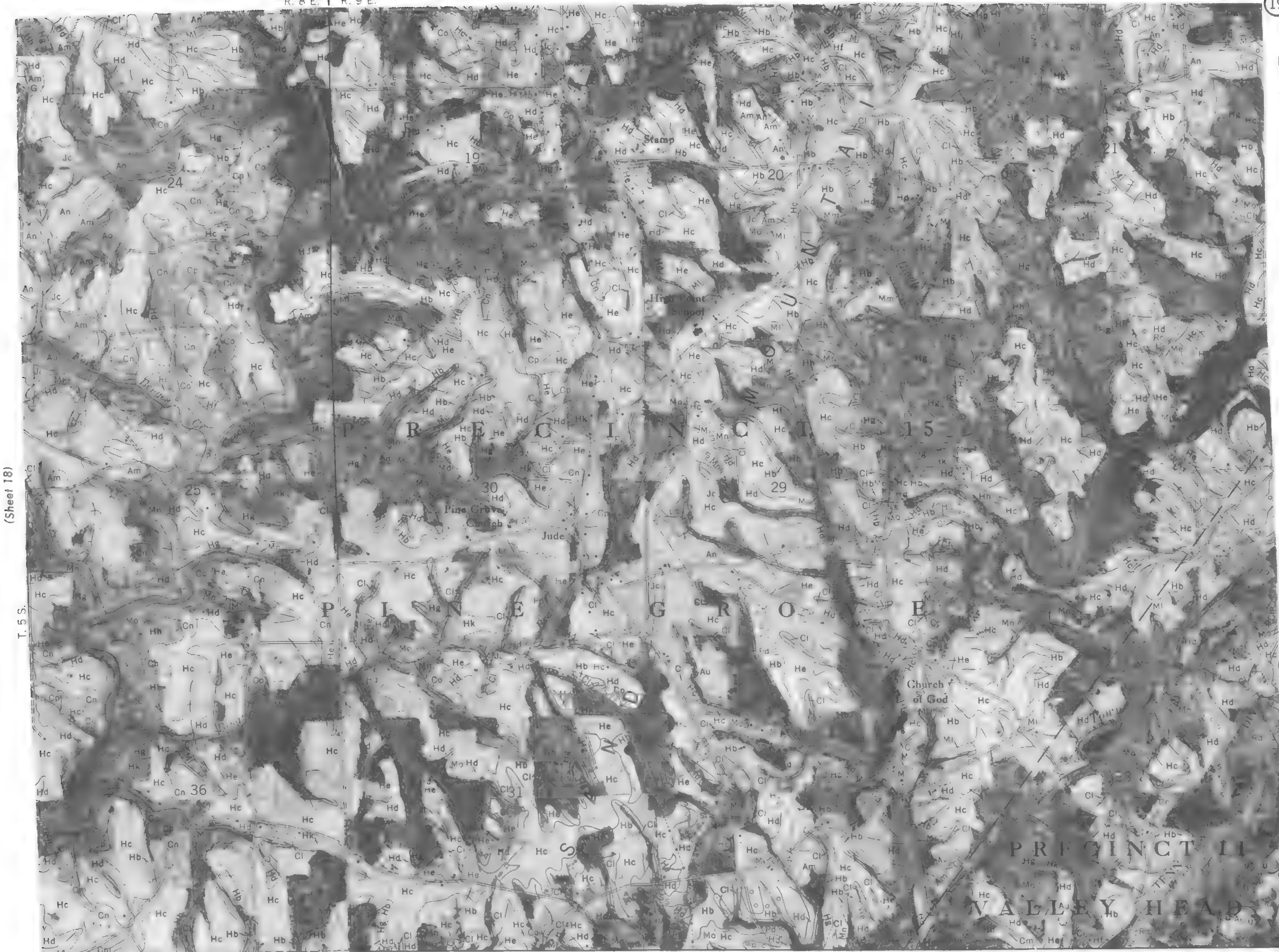


(Sheet 17)

(Sheet 19)

(Sheet 25)

R. 8 E. | R. 9 E.



(Sheet 26)


20
(Sheet 14)
R. 9 E.
R. 10 E.
N
PRECINCT 15
PINE GROVE
PRECINCT 12
PHILLIPS
Biddle Gap
Council Bluff
Old Biddle Gap
Hammondville
PRECINCT
VALLEY HEAD
Hammond Gap
Bethel Church
Valley Head
(Sheet 19)
(Sheet 21)
T. 5 S.
(Sheet 27)
0
1/2
1 Mile
0
5000 Feet

R. 10 E.

(Sheet 20)

T. 5 S.

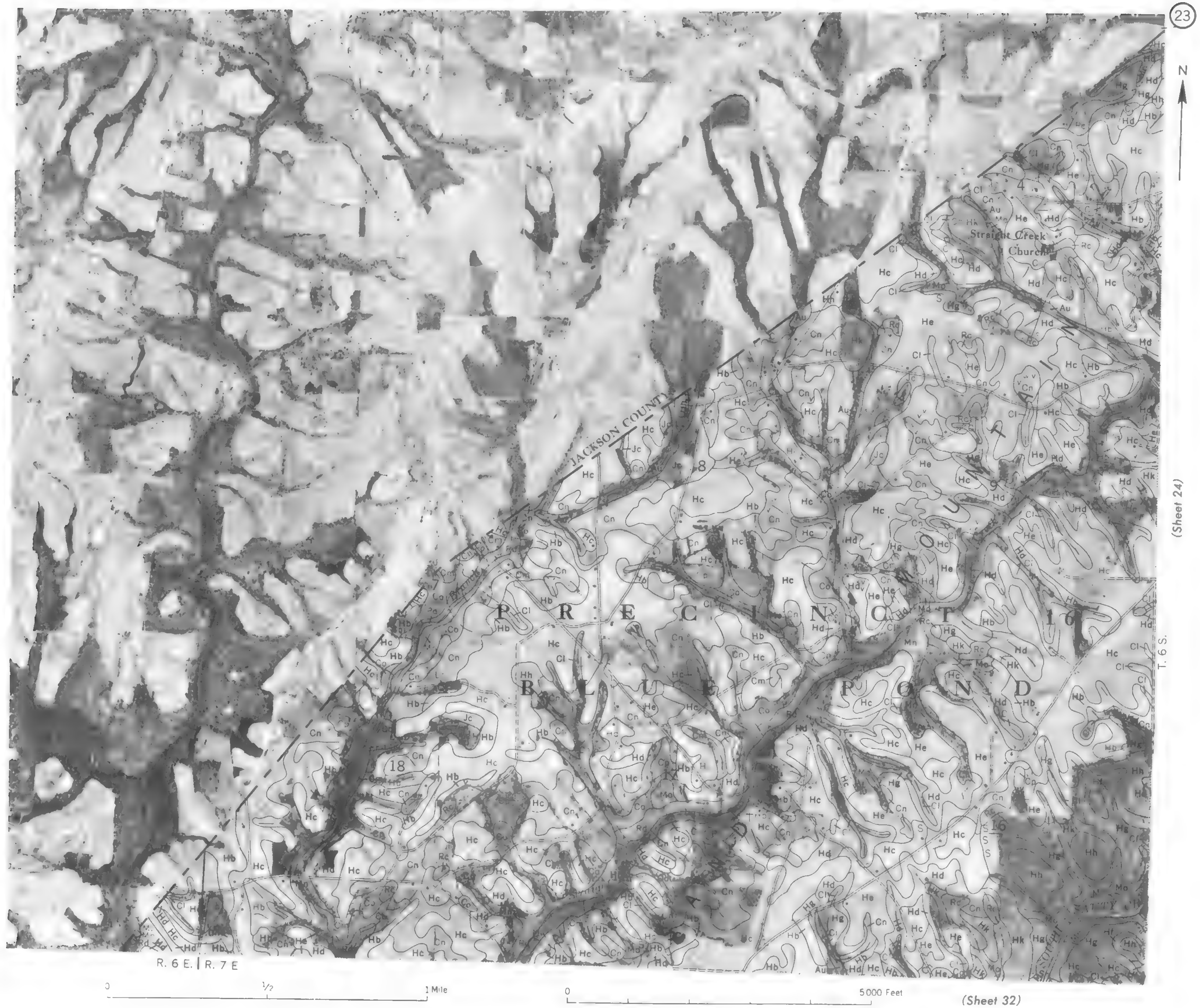
(Sheet 22)

(Sheet 28)

0 1/2 1 Mile

0 5000 Feet


22
(Sheet 16)
R. 10 E.
R. 11 E.
N
New Lookout Church
WALKER COUNTY
CHATTOOGA COUNTY
GEORGIA
PRECINCT 21
MENTONE
LOOKOUT MOUNTAIN
(Sheet 21)
T. 5 S.
(Sheet 29)
0
1/2
1 Mile
0
5000 Feet

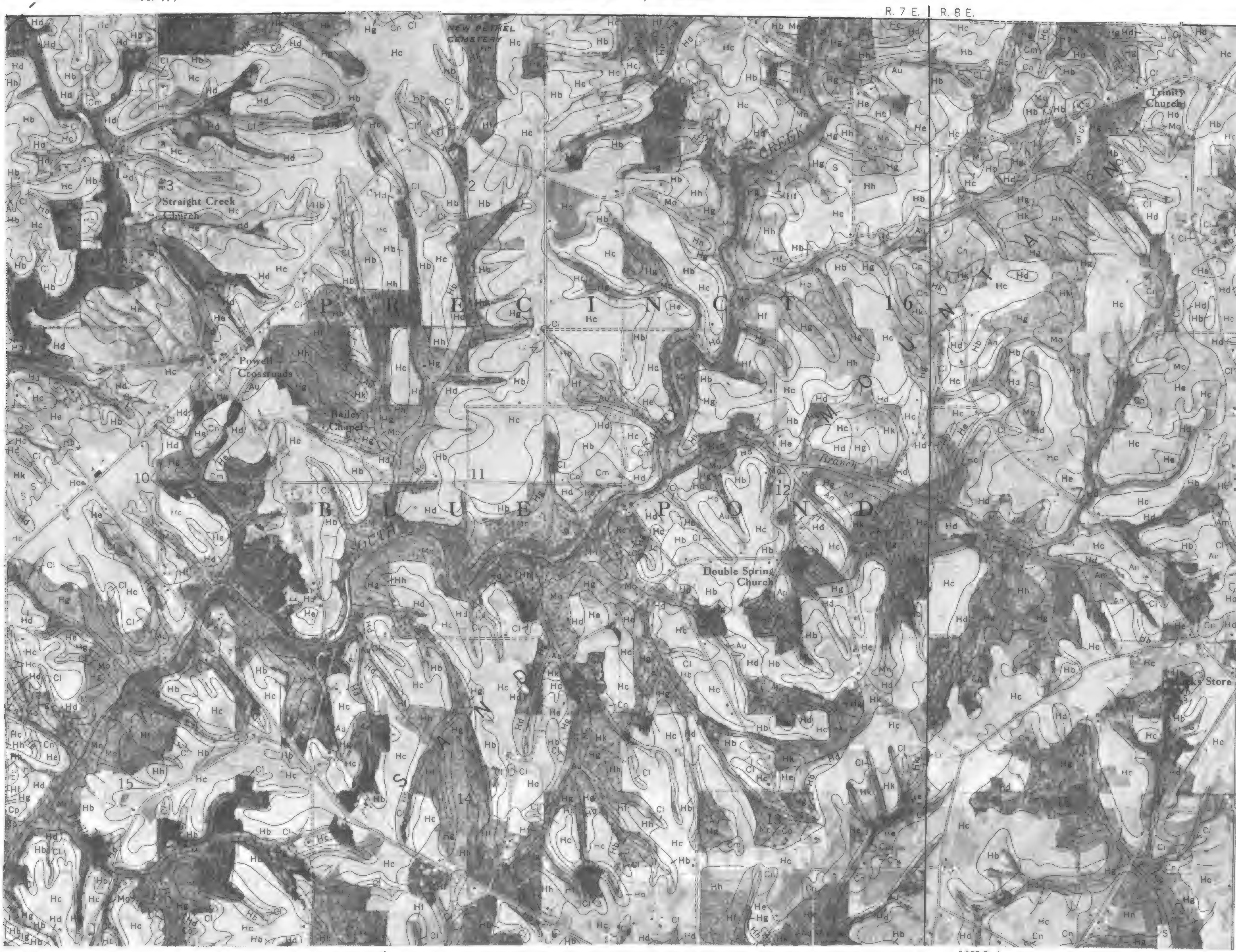


23
N
JACKSON COUNTY
Straight Creek Church
PRECINCT
BLUE POND
(Sheet 24)
T. 6 S.
R. 6 E. | R. 7 E.
0
1/2
1 Mile
0
5000 Feet
(Sheet 32)

24

(Sheet 17)

(Sheet 23)



0 1/2 1 Mile

0 5000 Feet

(Sheet 33)

R. 8 E.

(Sheet 18)

25

(Sheet 24)

T. 6 S.

(Sheet 26)

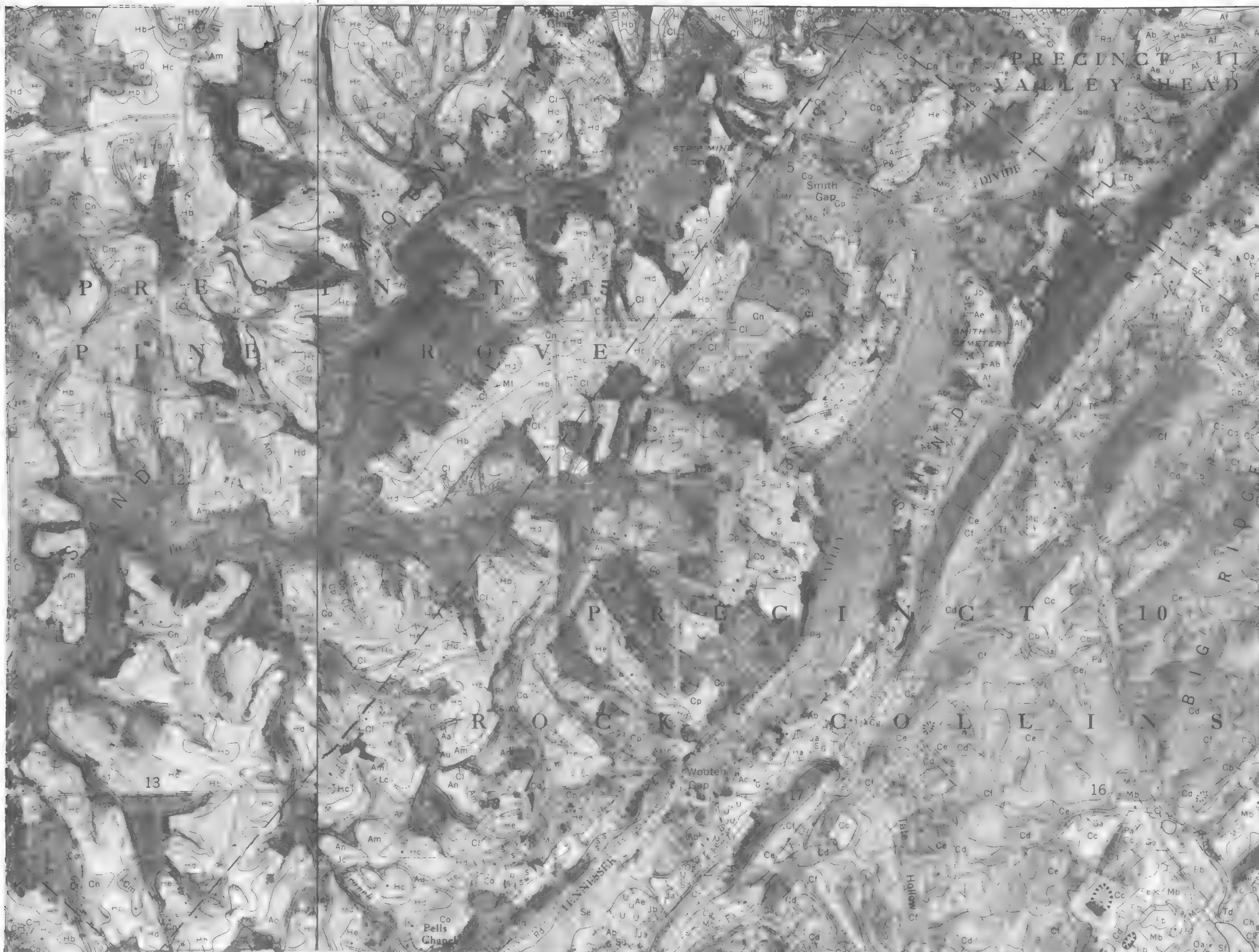
0 1/2 1 Mile

0 5000 Feet

(Sheet 43)

26

(Sheet 19)



(Sheet 25)

(Sheet 27)

(Sheet 35)

0 1/2 1 Mile

0 5000 Feet


R. 9 E. | R. 10 E.
N
(Sheet 26)
(Sheet 28)
(Sheet 36)
T. 6 S.
PRECINCT 11
VALLEY HEAD
PRECINCT 10
ROCK COLLINS
PRECINCT 21
MENTONE
BIG WILLS VALLEY
LITTLE RIDGE
LOOKOUT MOUNTAIN
RAILROAD
White Hall Church
WHITE HALL CEM.
SOUTHERN
Allen Spring
Allen Point
Wade Gap
Gulf
DE SOTO STATE PK.
0 1/2 1 Mile
0 5000 Feet

(Sheet 21)

R. 10 E.

(Sheet 27)

(Sheet 29)

(Sheet 37)

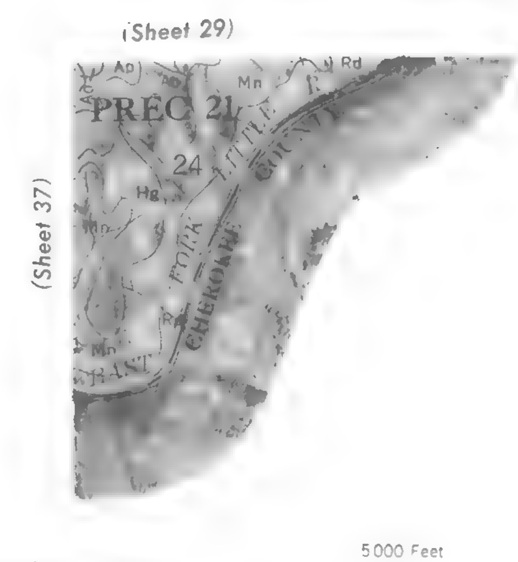
0 1/2 1 Mile

0 5000 Feet

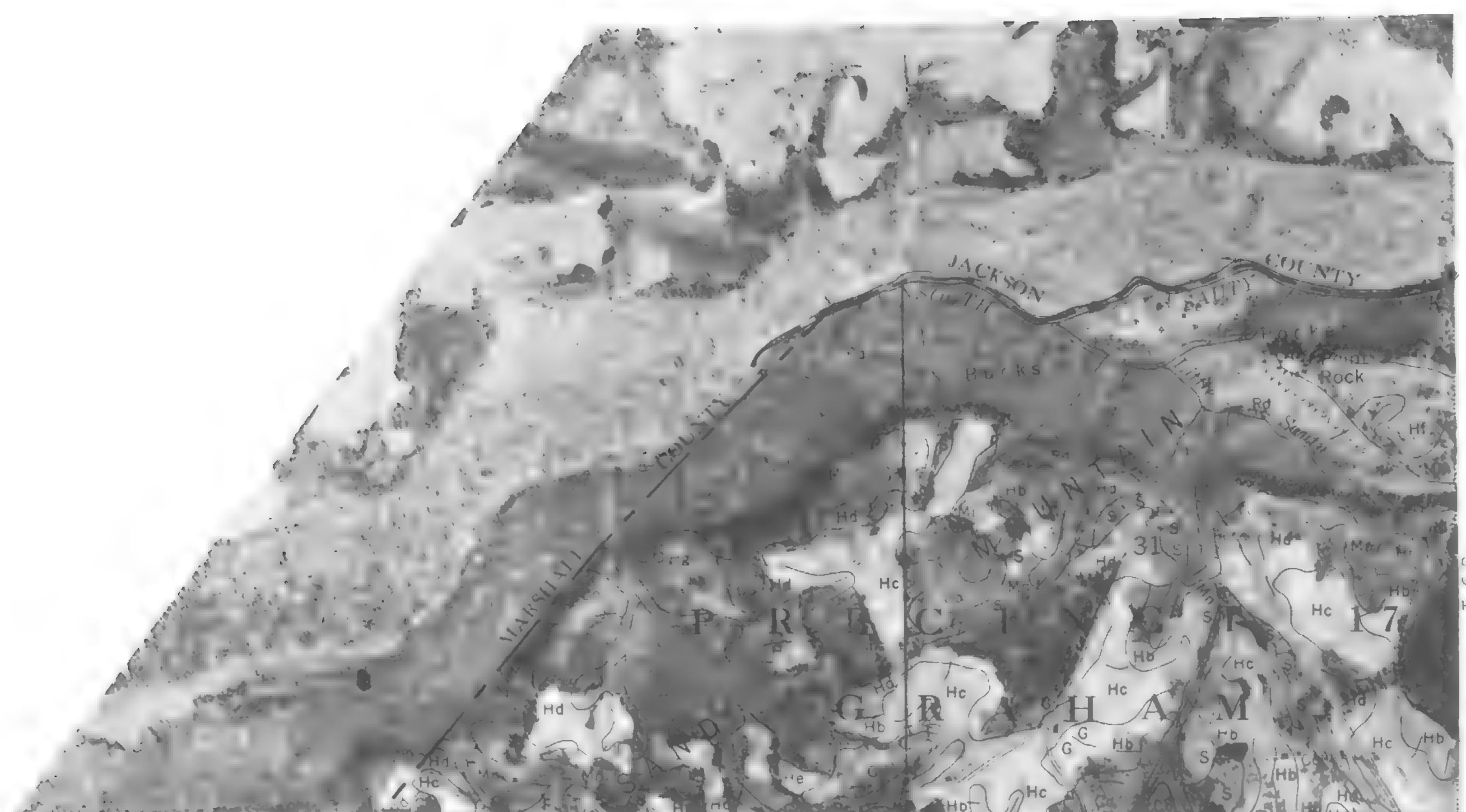
(Sheet 22)

29


R. 10 E.
R. 11 E.
N
(Sheet 28)
T. 6 S.
PRECINCT 21
MENTONE
LOOKOUT
MOUNTAIN
GEORGIA
Four Roads
Lake Lahusage
Lookout Mtn Camp
CHEROKEE COUNTY
EAST FORK LITTLE RIVER
(Inset)
0
1/2
1 Mile


(Sheet 29)
(Sheet 37)
PREC 21
24
0
5000 Feet

N



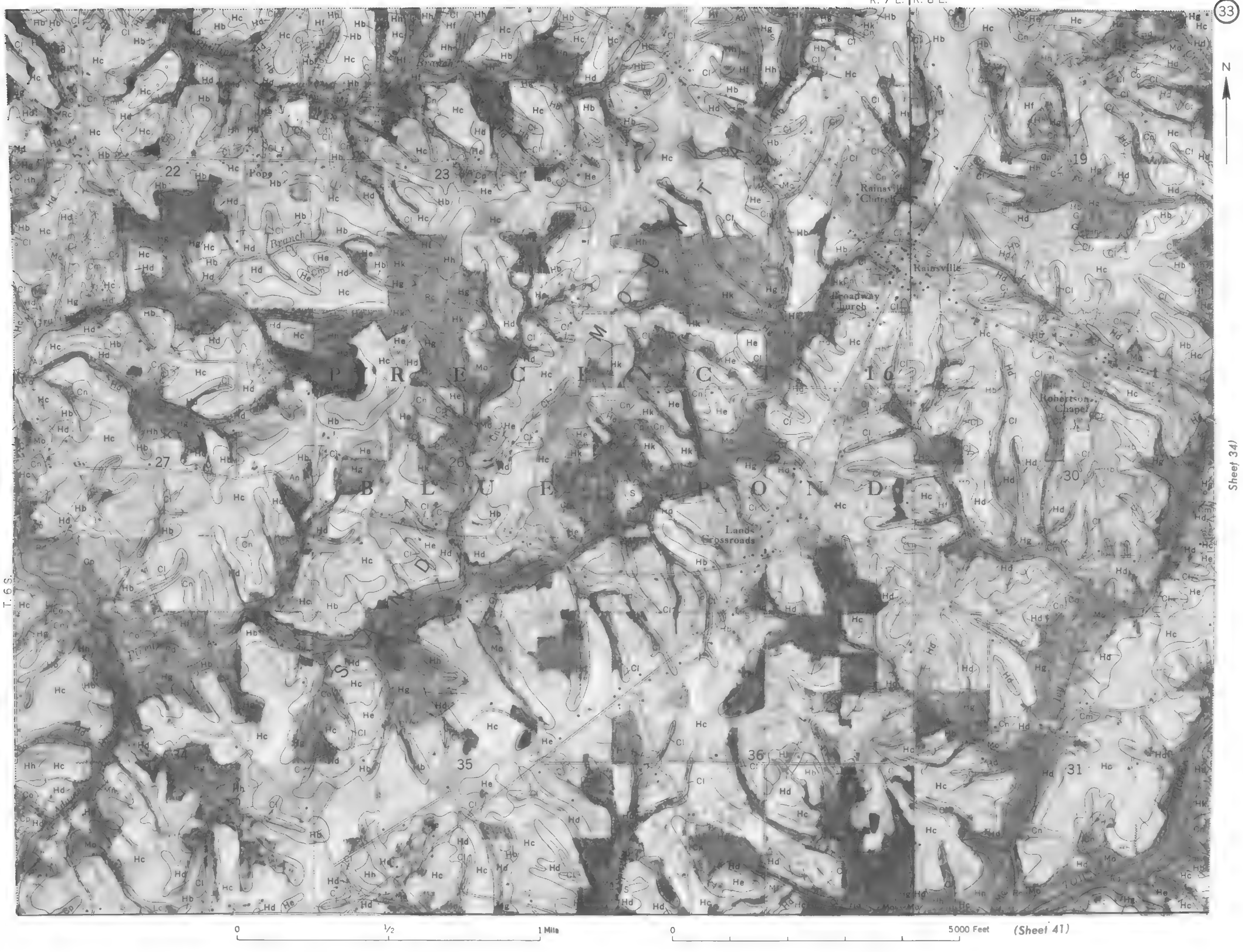
(Sheet 38

0 ½ 1 Mile

0 5000 Feet


31
N
(Sheet 30)
(Sheet 32)
PRECINCT 25
CORINTH
PRECINCT 17
GRAHAM
Middle Point
Mt Zion Church
Green Chapel School
26
33
34
35
32
T 6 S.
R. 6 E.
0
1/2
1 Mile
0
5000 Feet
(Sheet 39)

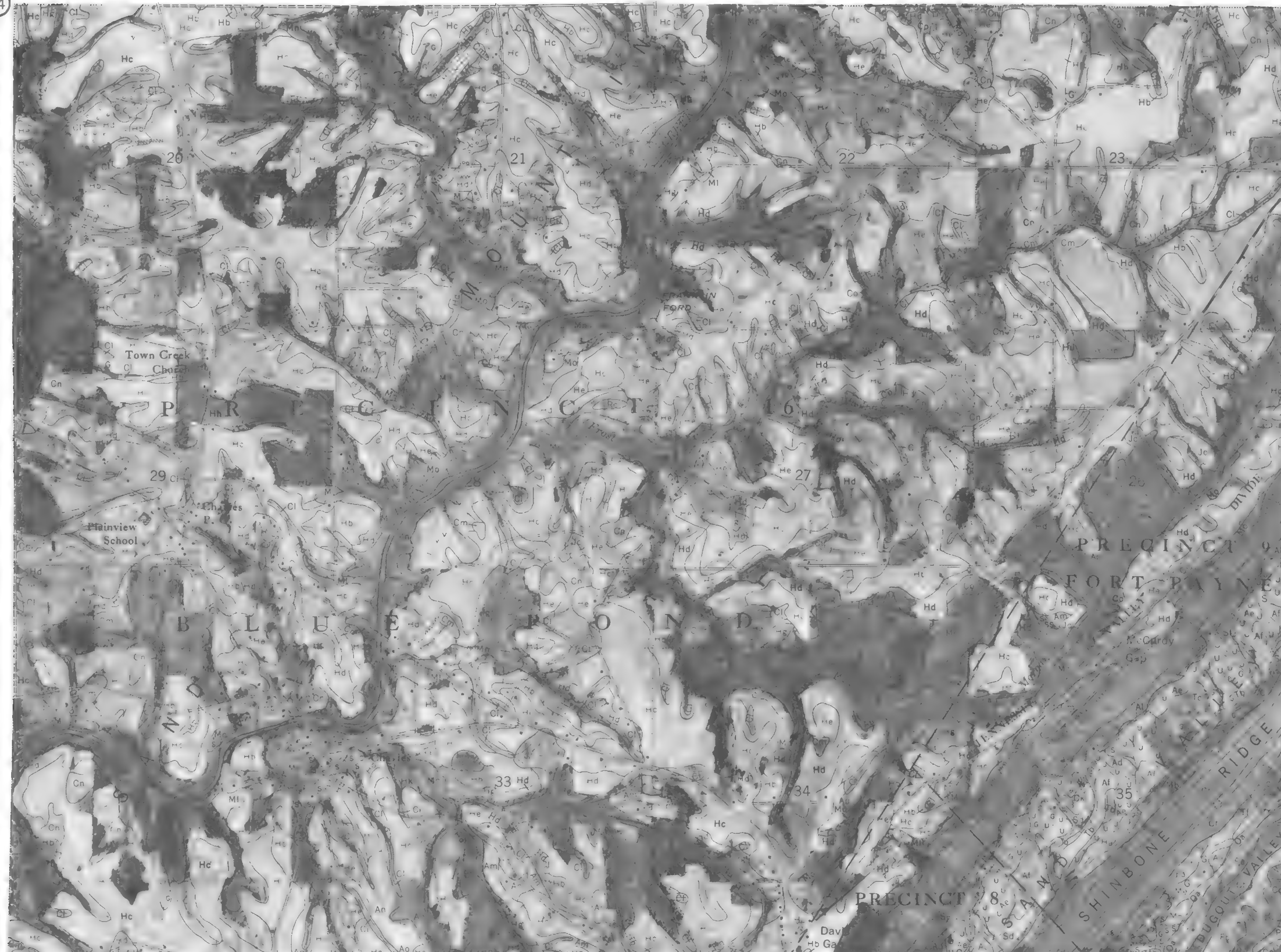

(Sheet 23)
R. 6 E. | R. 7 E.
N
(Sheet 31)
(Sheet 33)
T. 6 S.
(Sheet 40)
JACKSON COUNTY
OLD SAULT MILL BRIDGE
Zion Hill
PRECINCT 16
BLUE POND
SAND
PRECINCT 25
CORINTH
Antioch School
Antioch Church
Pilgrim Rest Church
Warren Church
Gibson Crossroads
19
20
21
24
25
28
29
30
31
32
33
36
0 1/2 1 Mile
0 5000 Feet


R. 7 E. | R. 8 E.
N
(Sheet 32)
(Sheet 34)
T. 6 S.
PRECINCT
BLUE POND
MOUNT
SAND
Rainsville
Rainsville Church
Broadway Church
Robertson Chapel
Lands Crossroads
Pope
Branch
22
23
24
19
16
27
26
25
30
34
35
36
31
0
1/2
1 Mile
0
5000 Feet

34

(Sheet 25)

R. 8 E.



(Sheet 33)

(Sheet 35)

(Sheet 42)

0 1/2 1 Mile


R. 8 E.
R. 9 E.
(Sheet 26)
35
N
PRECINCT 16
DIVIDE
VALLEY
RIDGE
PRECINCT 10
ROCK COLLINS
Gibson Gap
Union Church
TENNESSEE
Walnut Grove Church
FRANKLIN CEMETERY
Wills Valley
SAND
SHINBONE VALLEY
PRECINCT 9
DUGOUT
FORT PAYNE
BIG
Big
Branch
Beeson
Crystal Lake Church
SCOTT CEMETERY
SOUTHERN
(Sheet 34)
(Sheet 36)
T. 6 S.
(Sheet 43)
0
1/2
1 Mile
0
5000 Feet

36

(Sheet 27)

R. 9 E. | R. 10 E.

(Sheet 35)

(Sheet 37)

(Sheet 44)

0 1/2 1 Mile

0 5000 Feet

R. 10 E.

(Sheet 28)

37

(Sheet 36)

T. 6 S.

(Inset Sheet 29)

(Sheet 45)

0 ½ 1 Mile

0 5000 Feet

DE KALB COUNTY, ALABAMA

(Sheet 30) R. 5 E. | R. 6 E.

(Sheet 46)

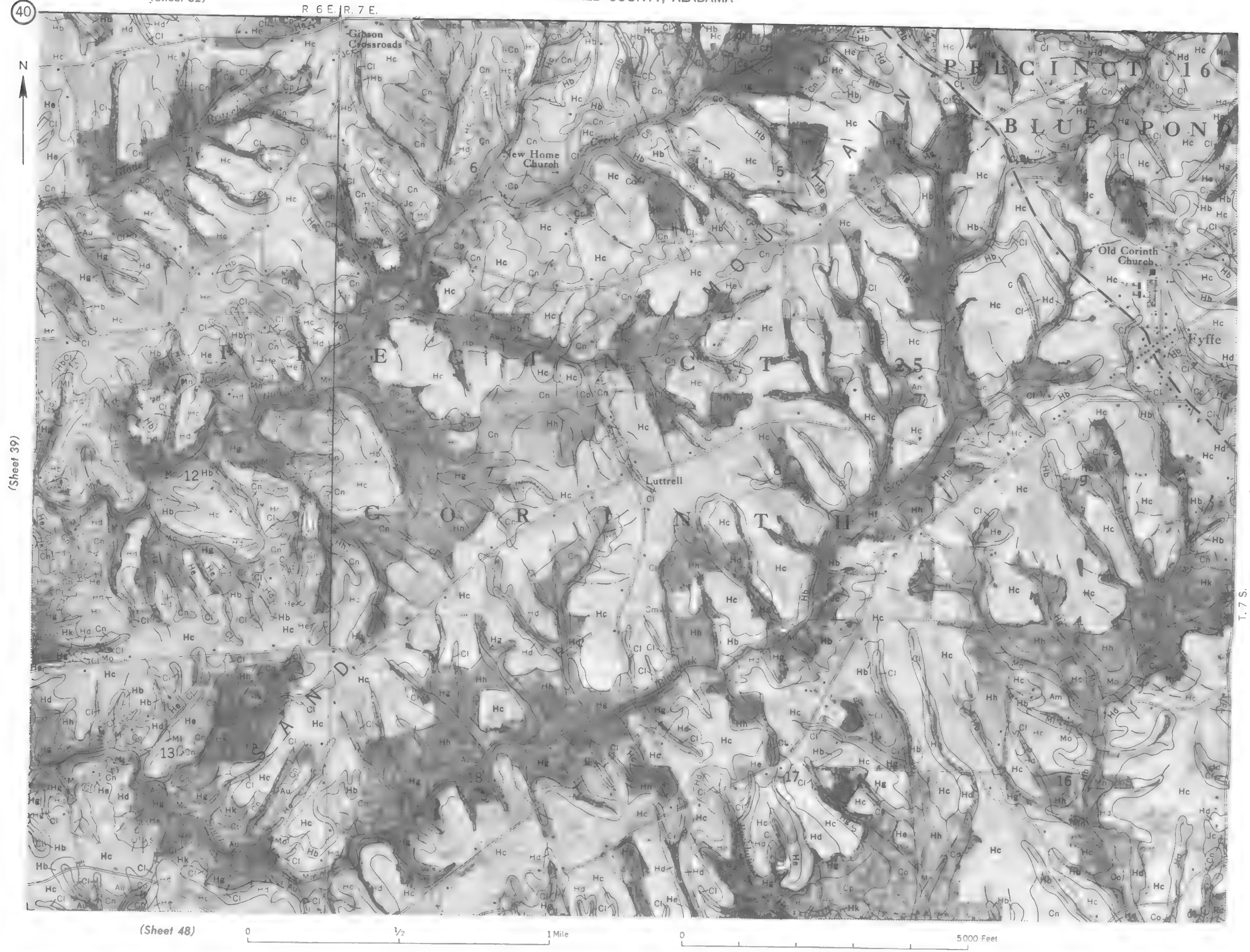
0 ½ 1 Mile 0 5000 Feet

DE KALB COUNTY, ALABAMA

(Sheet 31)

39

R. 5 E.


R 6 E. R. 7 E.
N
Gibson Crossroads
New Home Church
PRECINCT 16
BLUE POND
Old Corinth Church
Fyffe
PRECINCT 25
Luttrell
CORINTH
SAND MOUNTAIN
(Sheet 39)
(Sheet 41)
T. 7 S.
(Sheet 48)
0
1/2
1 Mile
0
5000 Feet


R. 7 E.
R. 8 E.
N
(Sheet 40)
(Sheet 42)
(Sheet 49)
T. 7 S.
PRECINCT 16
BLUFF POND
MOUNTAIN
SAND
PRECINCT 25
CORINTH
PRECINCT 26
LYDIA
Brown Church
Spaulding Church
Pleasant Hill
Lydia
Guest
GUEST RIDGE
Mt Moriah Church
1 Mile
5000 Feet


R. 8 E.
N
PRECINCT 16
BLUE POND
SAND MOUNTAIN
PRECINCT 9
FORT PAYNE
PRECINCT 8
HUDSON HILL
VALLEY RIDGE
Bootsville Gap
Swindell Gap
Mt Hermon Church
MOUNT HERMON CEMETERY
PRECINCT 26
LYDIA
SAND DUGOUT
MIDDLE RIDGES
BIG WILLS VALLEY
(Sheet 41)
(Sheet 43)
T. 7 S.
(Sheet 50)
1 Mile
5000 Feet

R. 8 E. | R. 9 E.
T. 7 S.
(Sheet 42)
(Sheet 44)
(Sheet 51)
N
PRECINCT 9
FORT PAYNE
PRECINCT 20
ADAMSBURG
PRECINCT 8
PREC 10
WILLS VALLEY
BIG RIDGE
LOOKOUT MOUNTAIN
Little Wills Valley
Minvale
GREEN CEMETERY
FORT PAYNE WATER WORKS
Castle Rock
Log Cabin Church
Manitou Cave
Douglas
Fort Payne Gap
HAMMACK CEMETERY
SOUTHERN
0 1/2 1 Mile
0 5000 Feet

(Sheet 36)

44

(Sheet 43)

(Sheet 45)

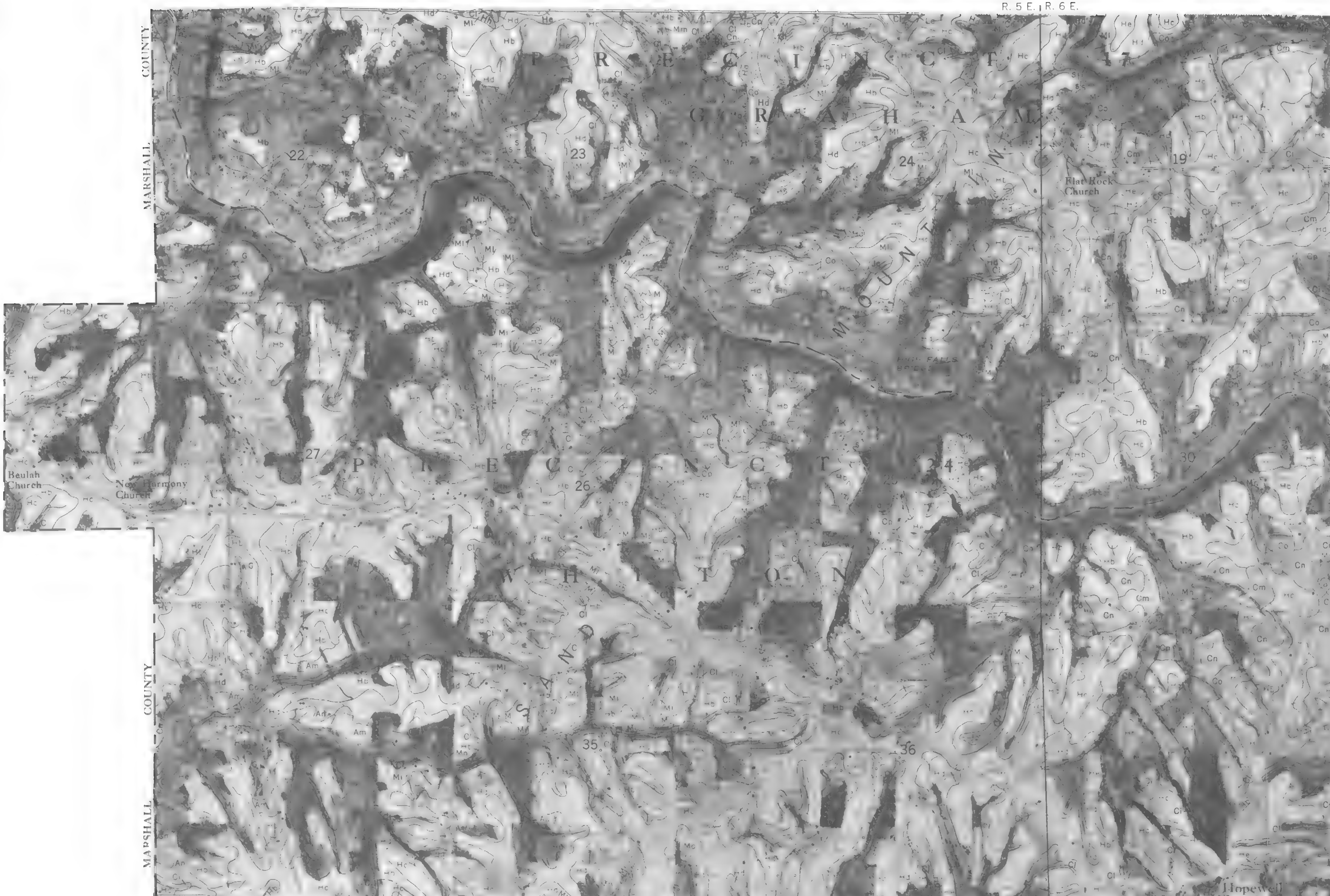
(Sheet 52)


R. 10 E.
(Sheet 44)
T. 7 S.
PRECINCT 28
NEW ORGAN
LOOKOUT MOUNTAIN
CHEROKEE COUNTY
(Inset)
0
1/2
1 Mile


R. 10 E.
(Sheet 45)
T. 7 S.
(Sheet 52)
PRECINCT 28
NEW ORGAN
LOOKOUT MOUNTAIN
20
0
5000 Feet

(Sheet 38)

R. 5 E. | R. 6 E.



(Sheet 47)

T. 7 S.

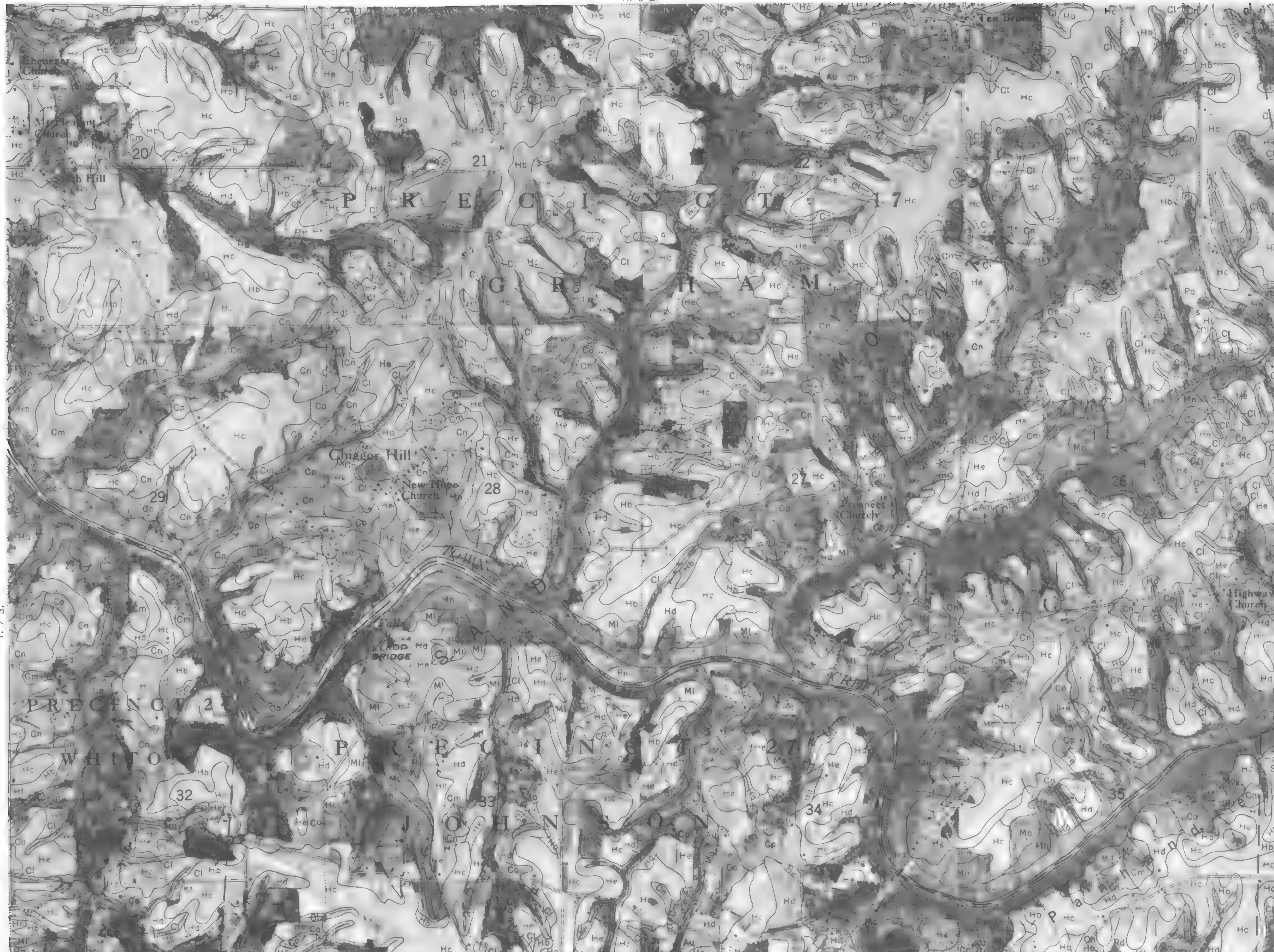
(Sheet 53)

0 ½ 1 Mile

0 5000 Feet

R. 6 E.

(Sheet 39)



(Sheet 46)

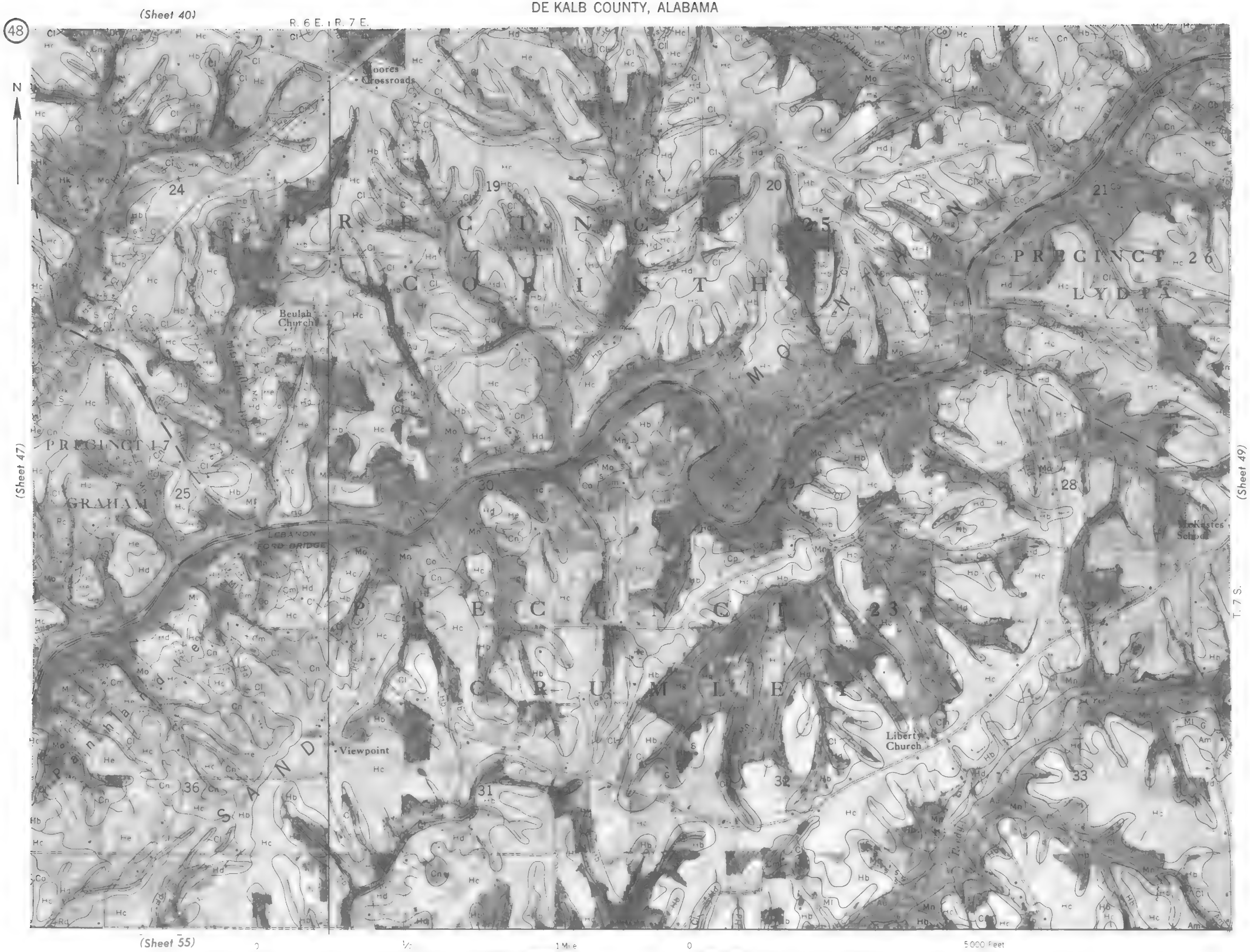
(Sheet 48)

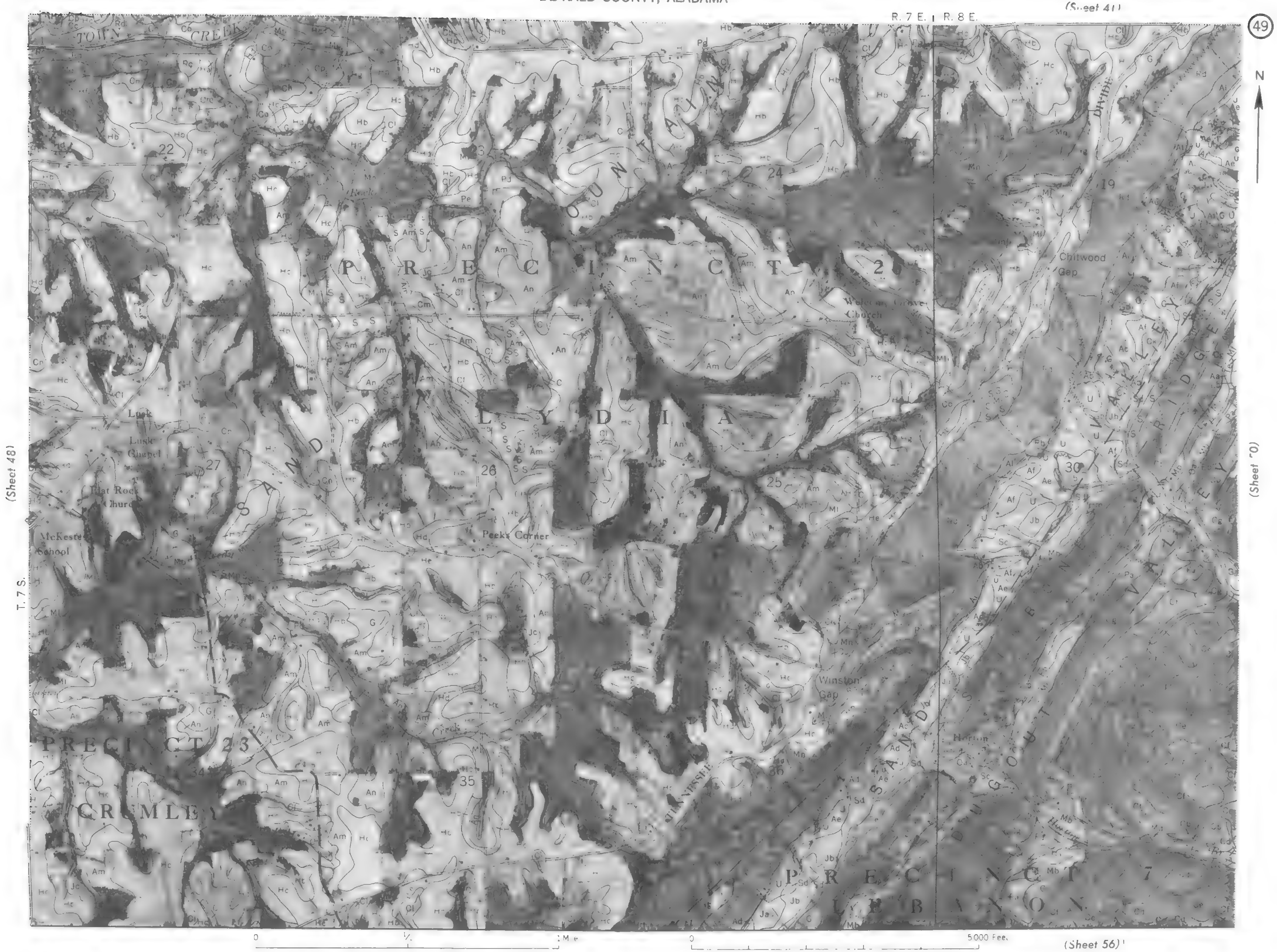
T. 7 S.

0 1/2 1 Mile

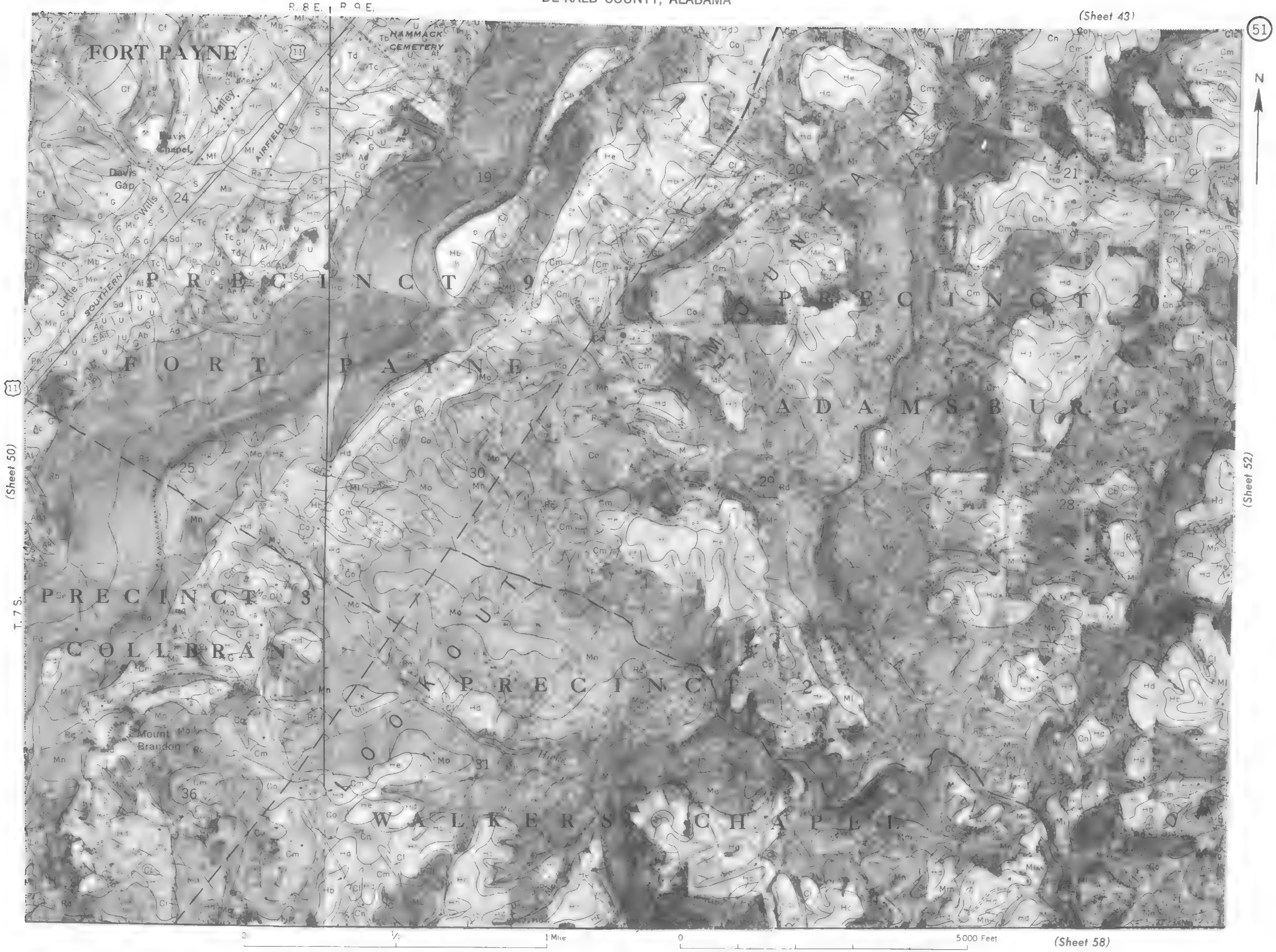
0 5000 Feet

(Sheet 54)


48
(Sheet 40)
R. 6 E. | R. 7 E.
N
Moores Crossroads
24
19
20
21
25
PRECINCT 25
CORINTH
MOUNTAIN
PRECINCT 26
LYDIA
Beulah Church
PRECINCT 17
GRAHAM
25
30
29
28
LEBANON FORD BRIDGE
McKestes School
PRECINCT 23
CRUMLEY
Liberty Church
Viewpoint
SAND
36
31
32
33
T. 7 S.
(Sheet 47)
(Sheet 49)
(Sheet 55)
0
½
1 Mile
0
5000 Feet


49
N
R. 7 E.
R. 8 E.
T. 7 S.
(Sheet 48)
(Sheet 56)
TOWN CREEK
PRECINCT 2
LYDIA
SAND MOUNTAIN
PRECINCT 23
CRUMLEY
PRECINCT 7
LEBANON
Chitwood Gap
Welcome Grove Church
Lusk
Lusk Chapel
Flat Rock Church
McKester School
Peeks Corner
Winston Gap
Horton
22
24
19
27
26
25
30
34
35
36
0
1/2
5000 Feet

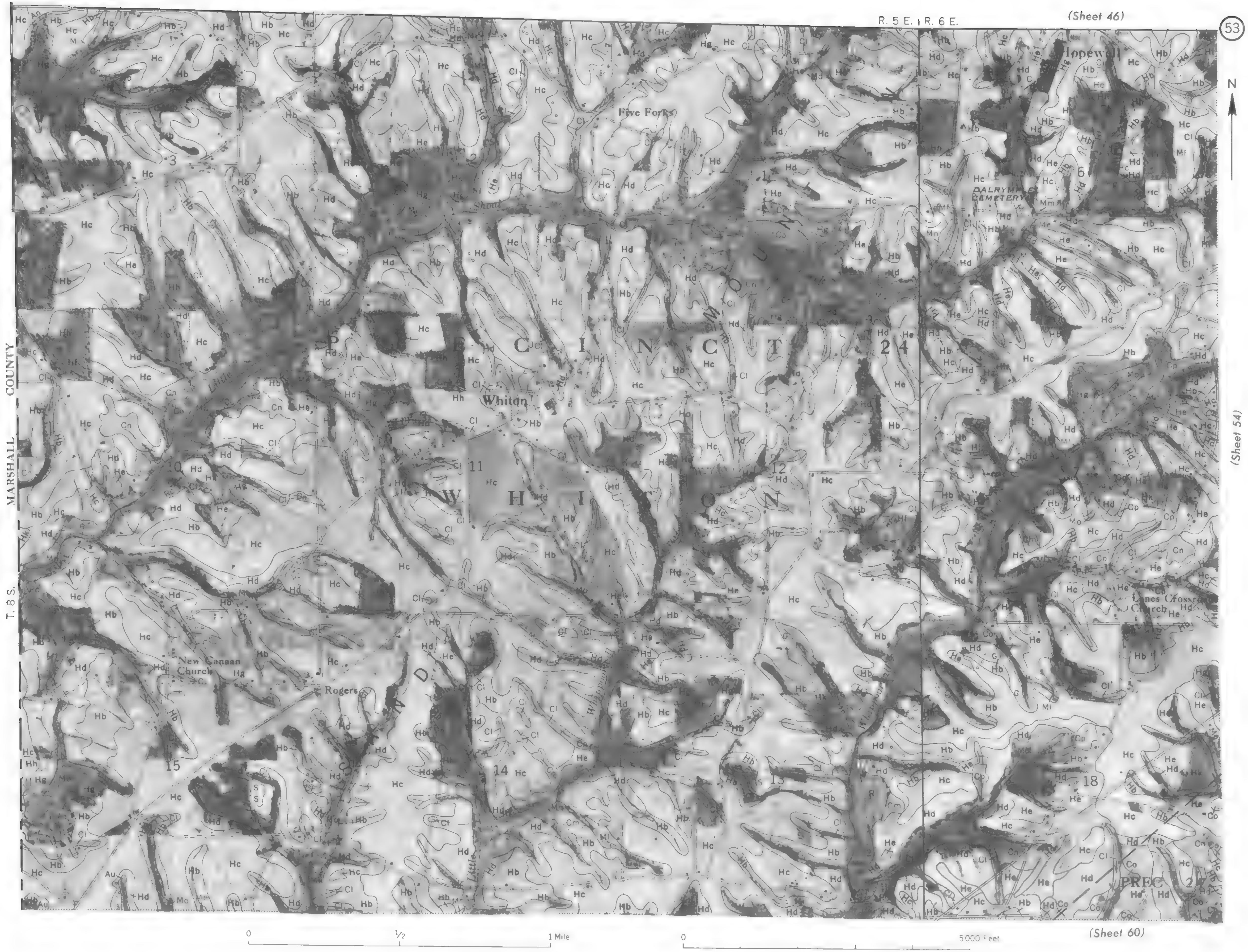

50
(Sheet 42)
R. 8 E.
N
PREC 26
PRECINCT 8
PRECINCT 9
FORT PAYNE
HUDSON HILL
THE DUGOUT VALLEY
MIDDLE RIDGE
PRECINCT 7
LEBANON
PRECINCT 3
COLLBRAN
Log Cabin School
Killian Mill
FORD
Collbran Gap
Gravel Hill Church
Collbran
SOUTHERN
VALLEY
LITTLE
20
21
22
23
26
28
29
32
33
34
35
(Sheet 49)
(Sheet 51)
T. 7 S.
11
(Sheet 57)
0
½
1 Mile
0
5000 Feet

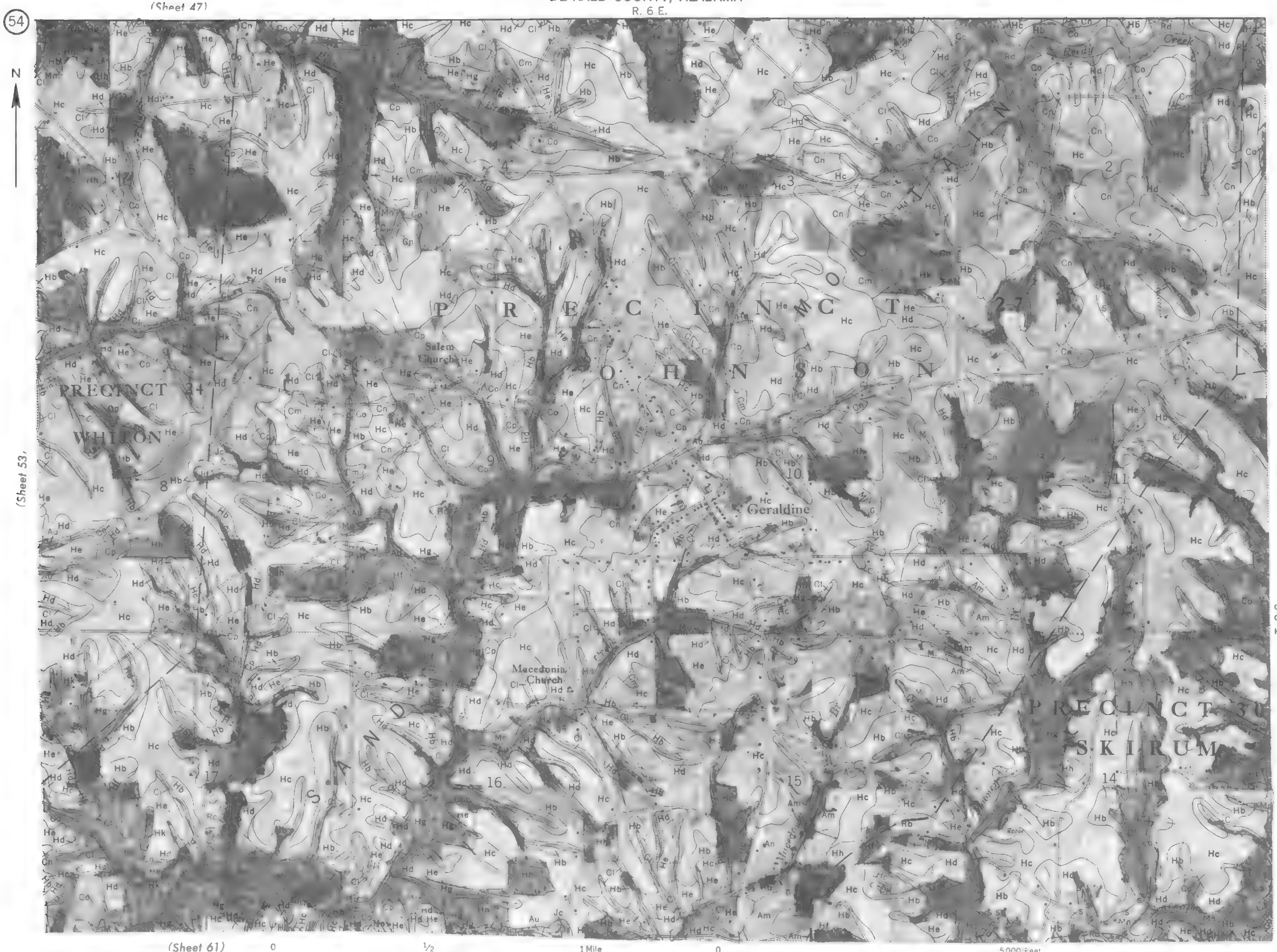


R. 8 E.
R. 9 E.
(Sheet 43)
51
N
FORT PAYNE
HAMMACK CEMETERY
Davis Chapel
Davis Gap
Wills Valley
AIRFIELD
SOUTHERN
Little
PRECINCT 9
FORT PAYNE
PRECINCT 20
MOUNTAIN
ADAMSBURG
PRECINCT 3
COLLBRAN
PRECINCT 2
LOOKOUT
WALKERS CHAPEL
Mount Brandon
T. 7 S.
(Sheet 50)
(Sheet 52)
19
20
21
24
25
28
29
30
31
33
36
0
½
1 Mile
0
5000 Feet
(Sheet 58)

(52) (Sheet 44)

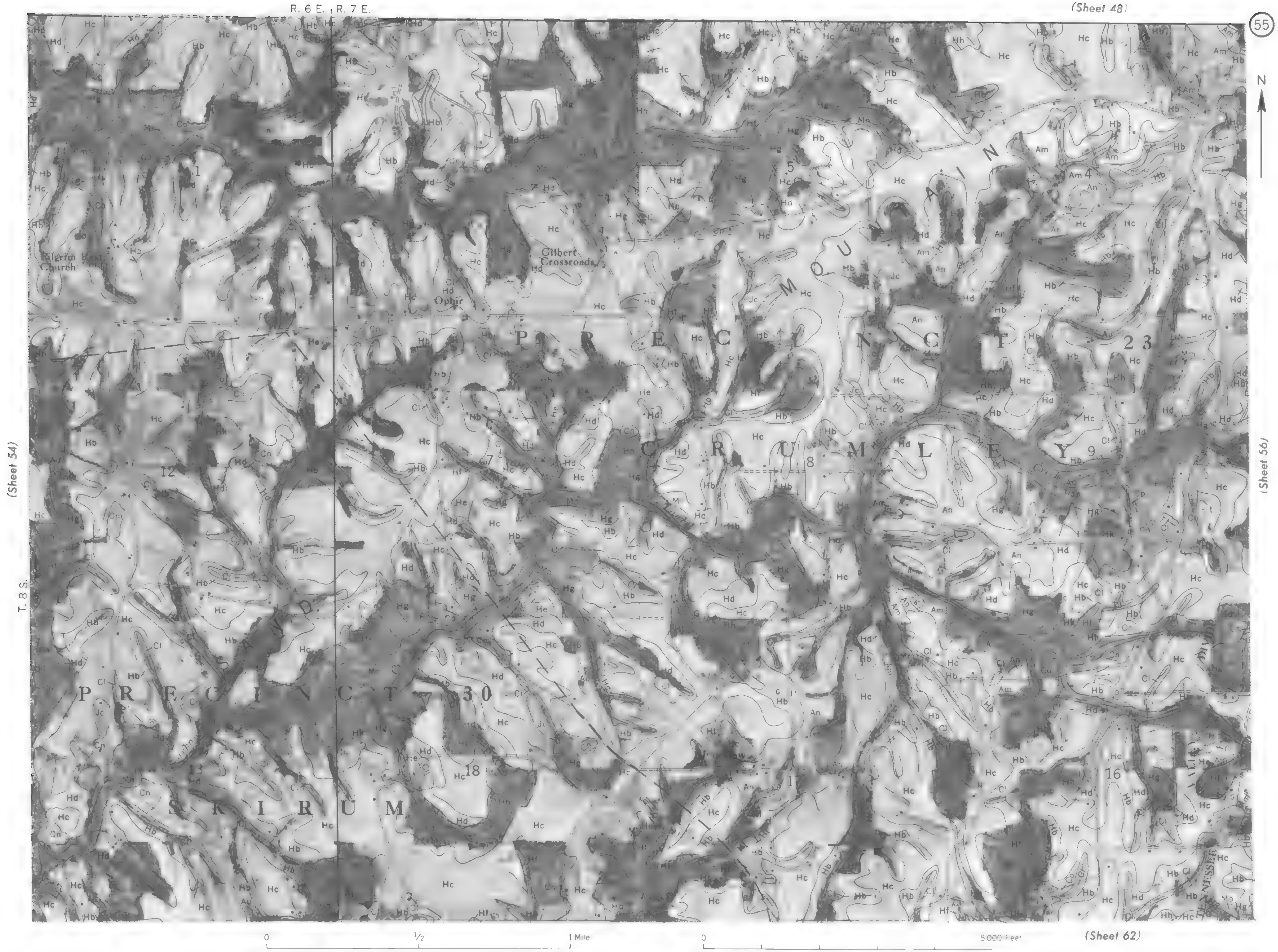

R. 9 E. | R. 10 E.
N
MOORE CEMETERY
STRIP MINE (COAL)
PRECINCT 28
NEW ORGAN
PRECINCT 20
ADAMSBURG
LOOKOUT MOUNTAIN
Liberty Hill Church
Adamsburg
Mt Carmel Church
Edna Hill Church
FALLS
LITTLE RIVER
22
23
24
19
27
26
25
35
36
31
T. 7 S.
(Sheet 51)
(Inset Sheet 45)
(Sheet 59)
0
½
1 Mile
0
5000 Feet


R. 5 E. | R. 6 E.
(Sheet 46)
53
N
Hopewell
Five Forks
DALRYMPLE CEMETERY
Whiton
MARSHALL COUNTY
T. 8 S.
(Sheet 54)
New Canaan Church
Rogers
Lanes Crossroad Church
PREC
(Sheet 60)
0
1/2
1 Mile
0
5000 Feet


54
(Sheet 47)
R. 6 E.
N
(Sheet 53)
(Sheet 55)
T. 8 S.
PRECINCT 24
WHITON
PRECINCT 27
JOHNSON
PRECINCT 30
SKIRUM
SAND
MOUNTAIN
Salem Church
Geraldine
Macedonia Church
(Sheet 61)
0
1/2
1 Mile
0
5000 Feet

(Sheet 48)

55


R. 6 E. R. 7 E.
N
Pilgrim Rest Church
Gilbert Crossroads
Ophir
PRECINCT 23
MOUNTAIN
CRUMLEY
SAND
PRECINCT 30
SKIRUM
T. 8 S.
(Sheet 54)
(Sheet 56)
(Sheet 62)
0 1/2 1 Mile
0 5,000 Feet

56

(Sheet 49)

R. 7 E. | R. 8 E.

(Sheet 55)

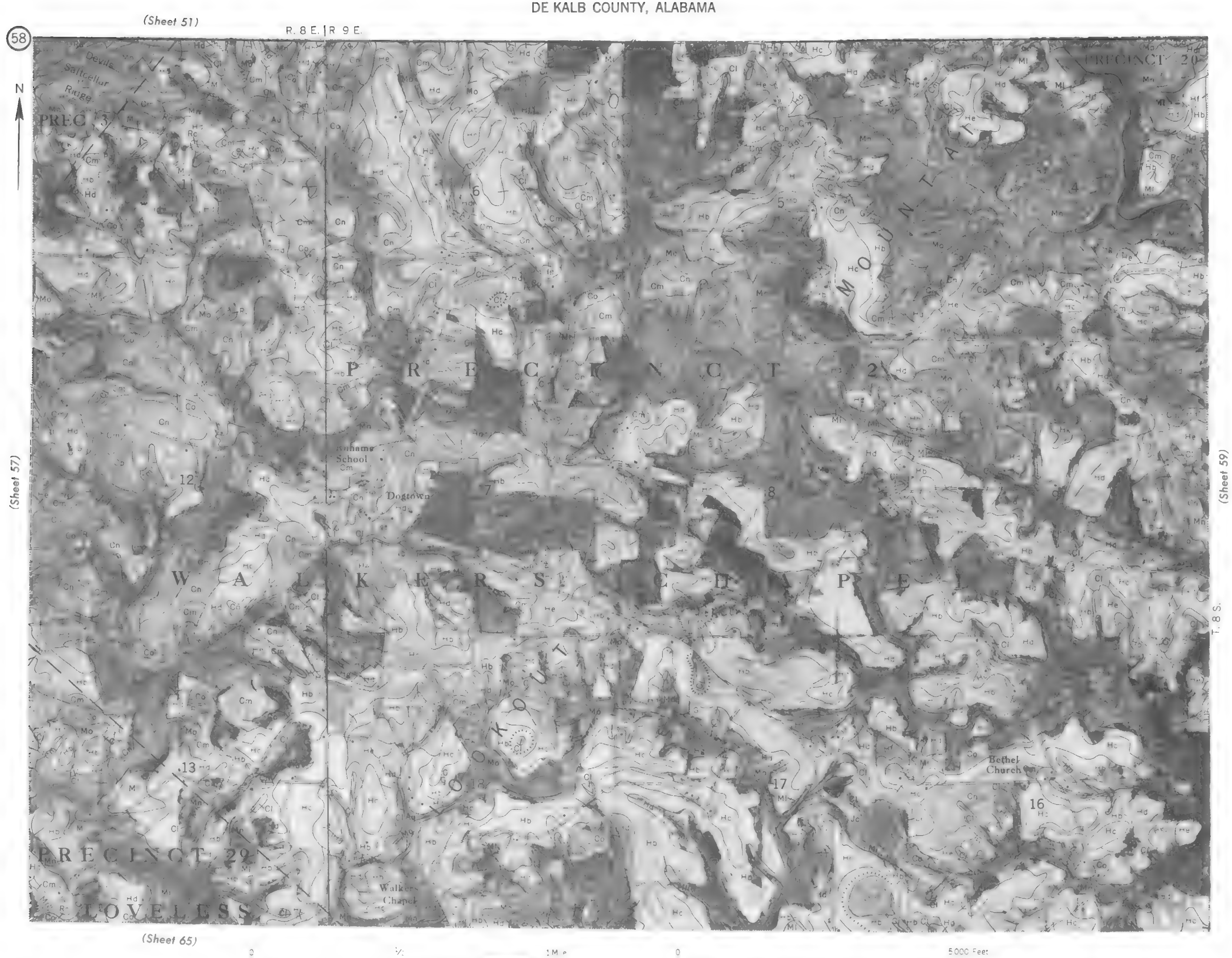
(Sheet 57)

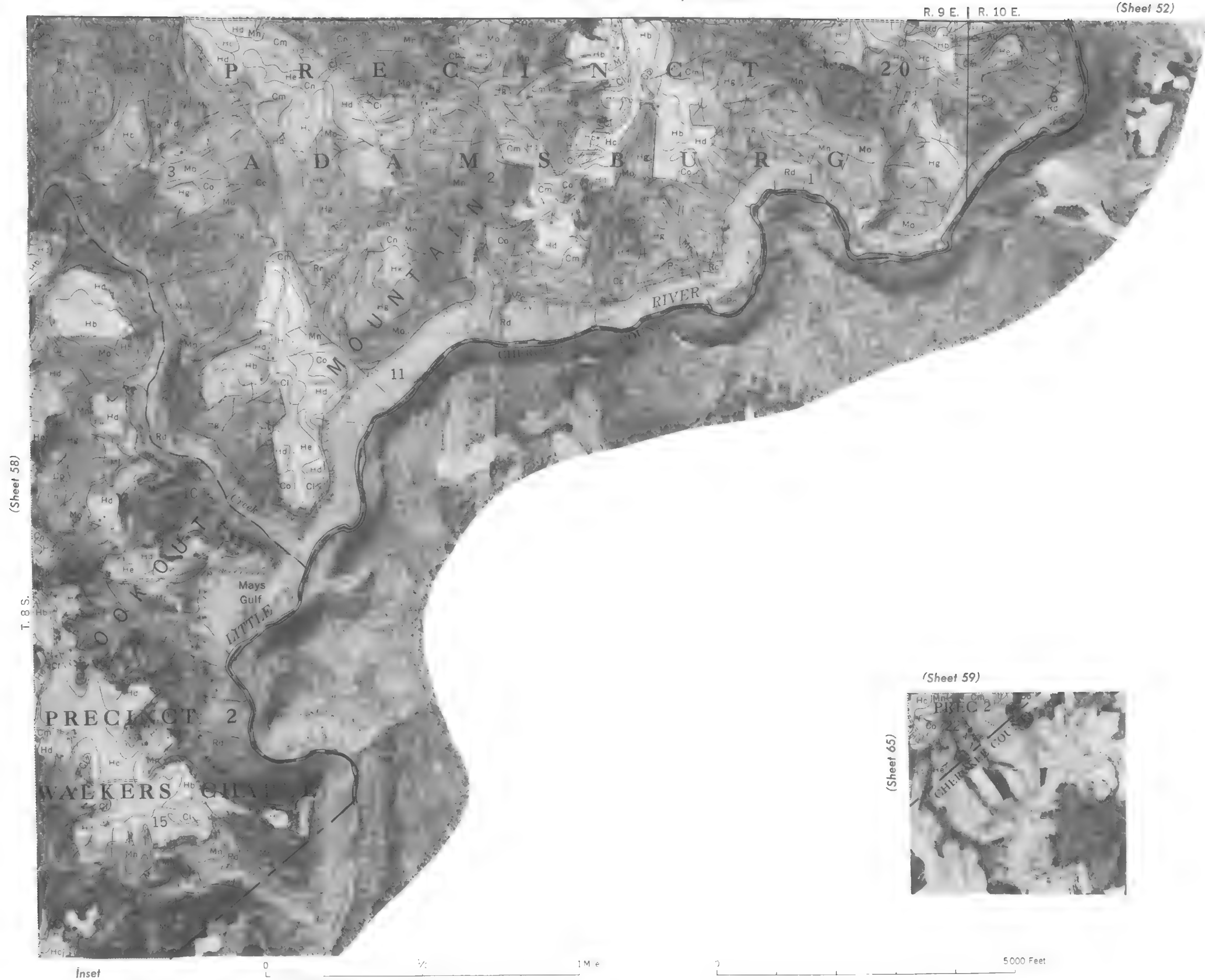
(Sheet 63)

0 ½ 1 Mile

0 5000 Feet


R. 8 E.
(Sheet 50)
57
N
Collbran
Lebanon
PRECINCT
LEBANON
WILLS VALLEY
RIDGE
SOUTHERN
BIG WILLS
PRECINCT 3
PRECINCT 2
Collbran Gap
Devils
Saltpeter Ridge
Mill Road Gap
KILLIAN CEMETERY
COLLBRAN
PRECINCT 29
LOOKOUT MOUNTAIN
LOVELESS
Straight Hollow
Tate Cove
Portersville Gap
(Sheet 56)
(Sheet 58)
T. 8 S.
0
½
1 Mile
5000 Feet
(Sheet 64)


58
(Sheet 51)
R. 8 E. | R. 9 E.
N
(Sheet 57)
(Sheet 59)
T. 8 S.
(Sheet 65)
PRECINCT 3
PRECINCT 20
PRECINCT 2
WALKERS CHAPEL
LOOKOUT
MOUNTAIN
PRECINCT 29
LOVELESS
Bethel Church
Walkers Chapel
Dogtown
School
0 ½ 1 Mile
0 5000 Feet


R. 9 E.
R. 10 E.
(Sheet 52)
(Sheet 58)
T. 8 S.
N
P R E C I N C T 20
A D A M S B U R G
MOUNTAIN
LOOKOUT
RIVER
LITTLE
Mays Gulf
PRECINCT 2
11
15
0
1 Mile
5000 Feet
(Sheet 59)
(Sheet 65)
PREC 2

Inset

(Sheet 53)

60

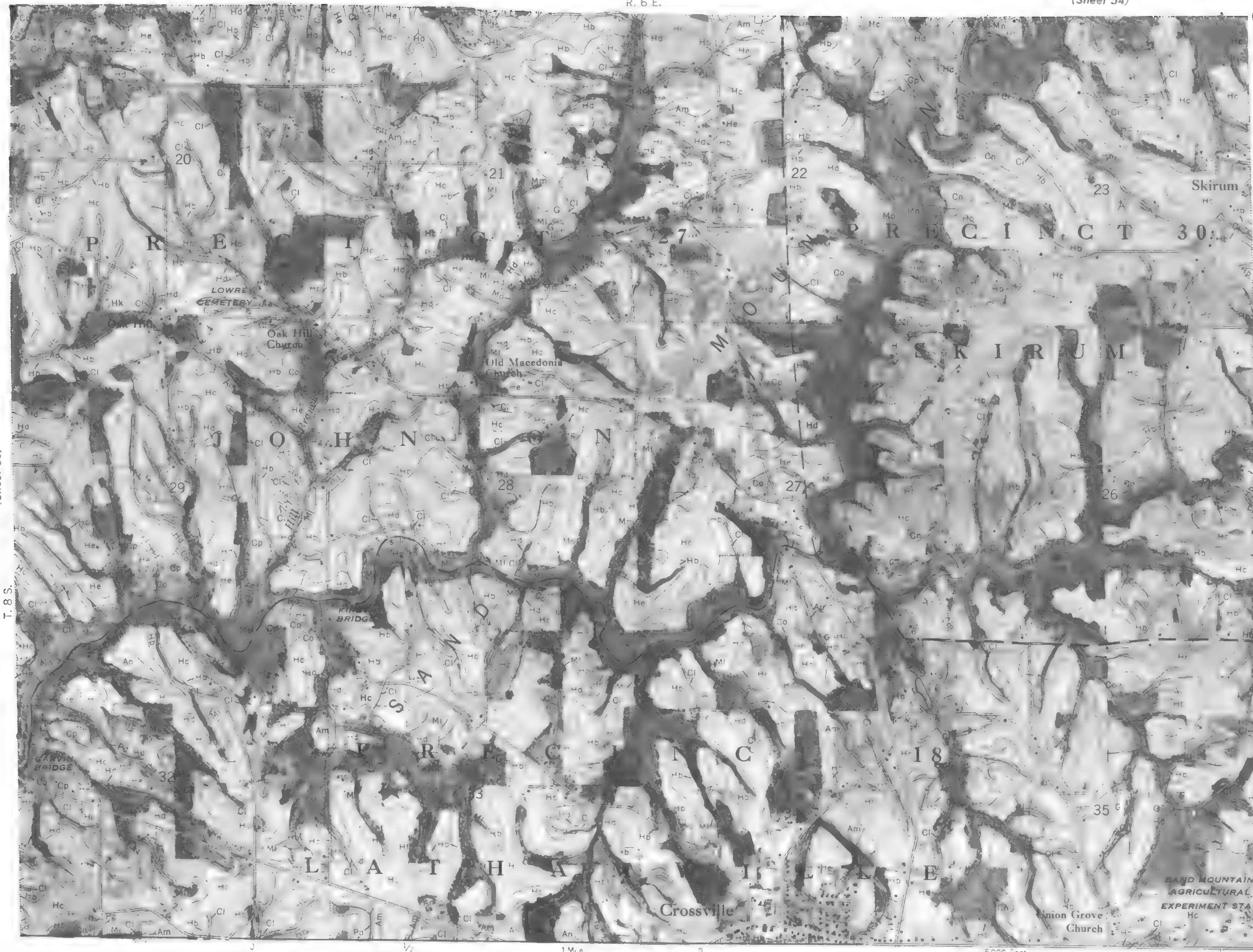
(Sheet 61)

(Sheet 66)

0 ½ 1 Mile

0 5000 Feet

(Sheet 60)



(Sheet 62)

(Sheet 67)

62

(Sheet 55)

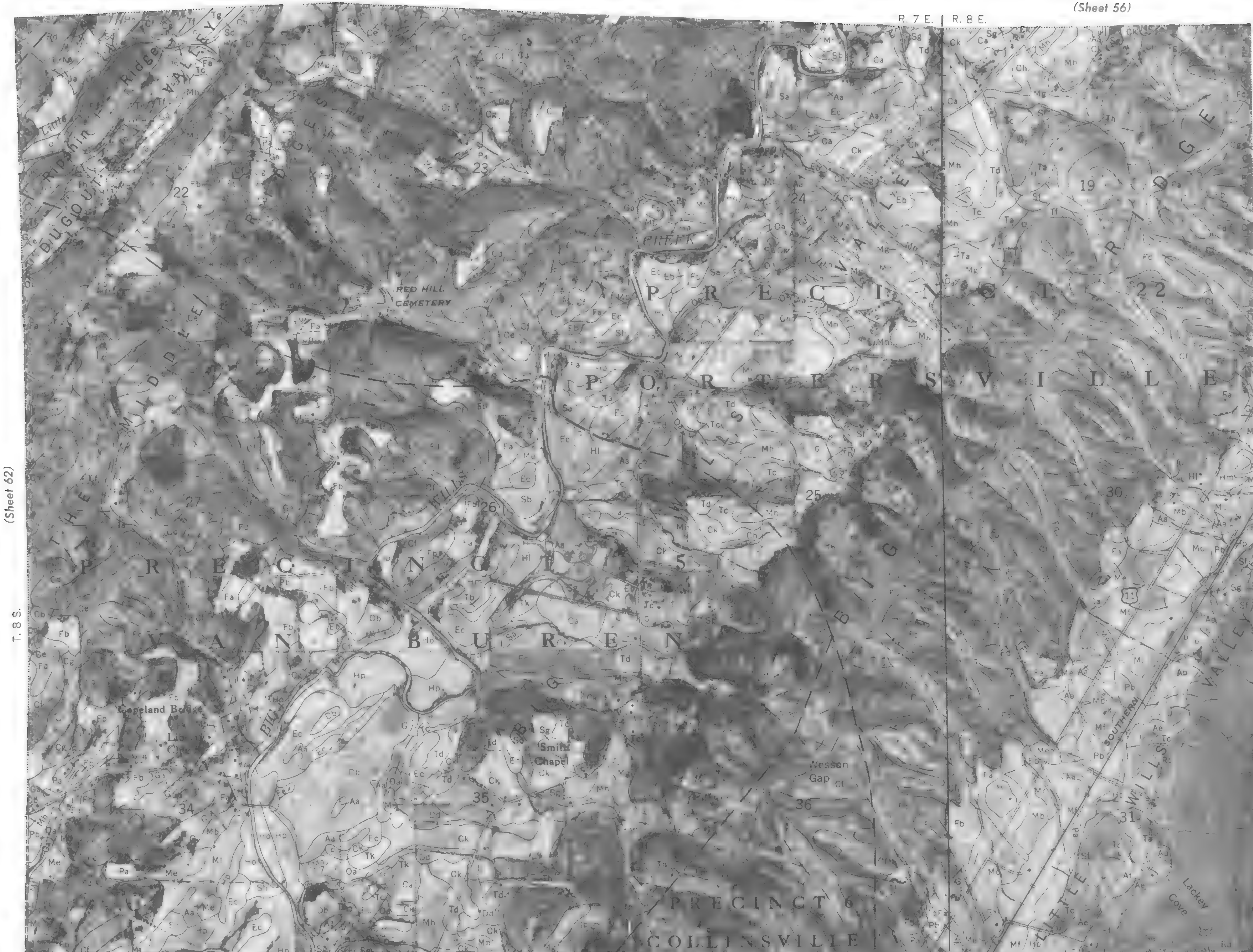
R. 6 E. | R. 7 E.

(Sheet 68)

0 ½ 1 Mile

0 5,000 Feet

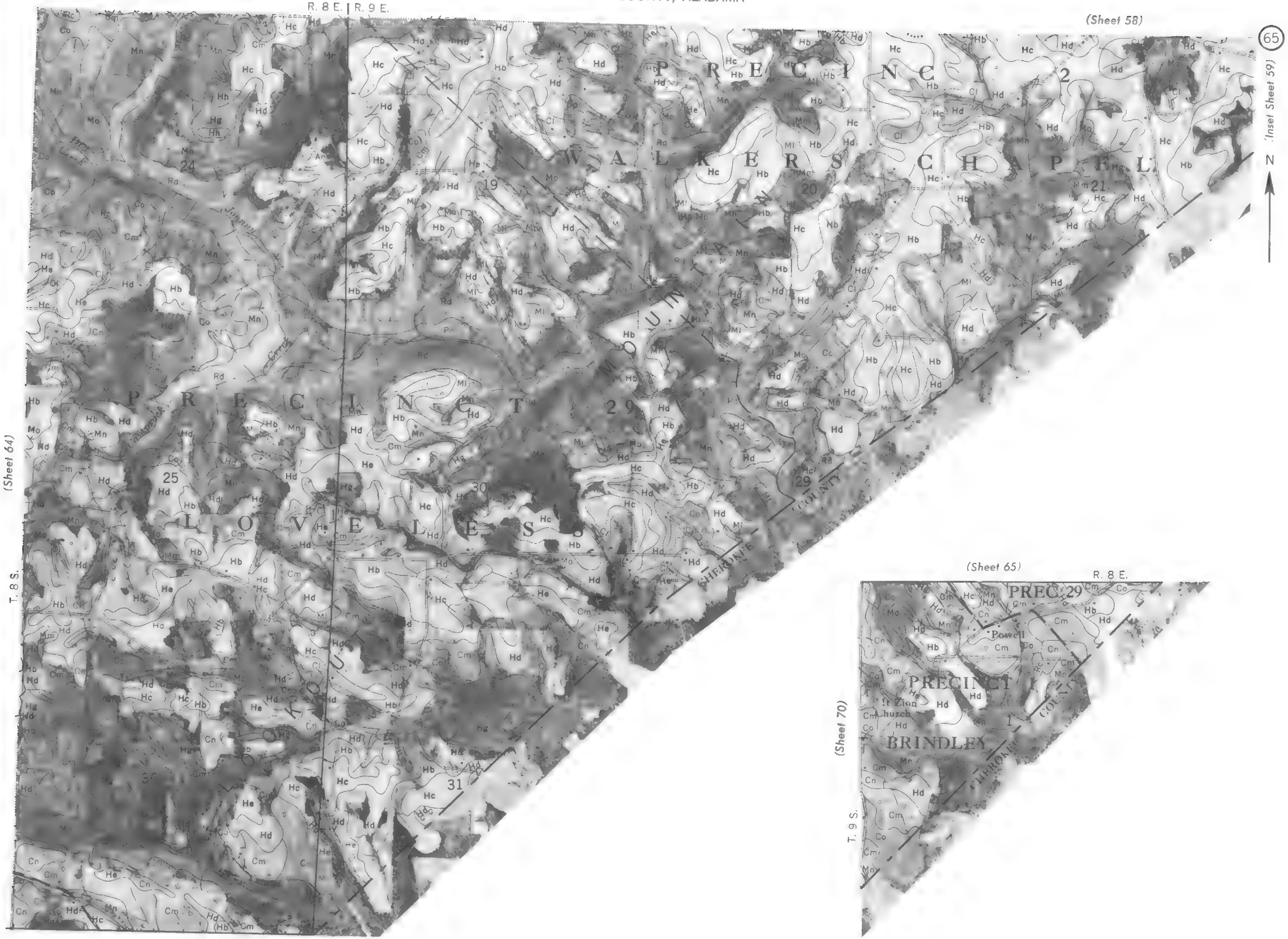
(Sheet 56)



0
5000 Feet

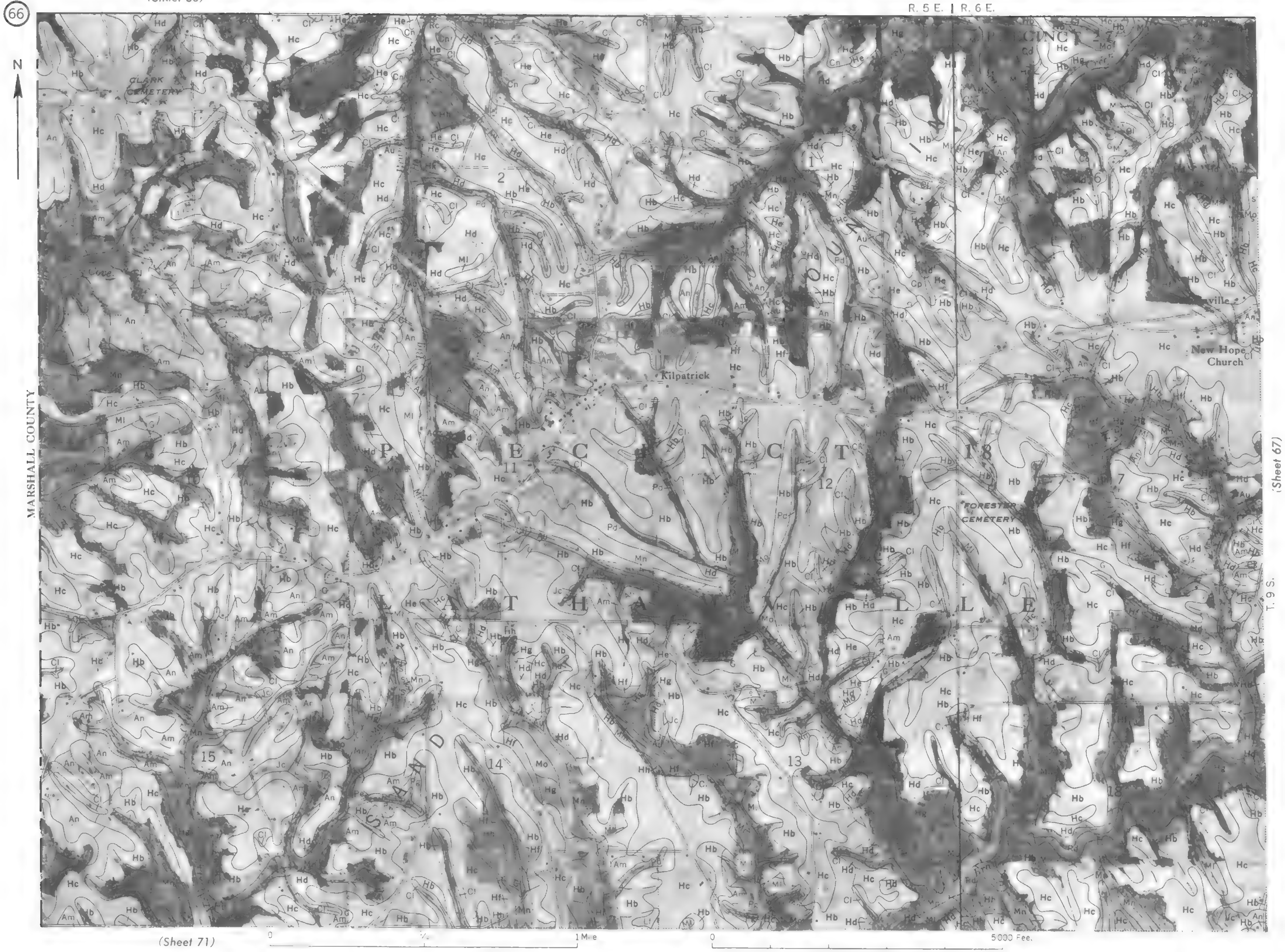
(Sheet 69)


(Sheet 57)
R. 6 E.
N
PRECINCT 3
COLLBRAN
Portersville
Portersville Gap
SOUTHERN
Valley
Little
Wills
PRECINCT
LOVELESS
MOUNTAIN
Loveless
McNutt Memorial Church
Portersville Gap
PRECINCT 22
PORTERSVILLE
Brown Fell School
Mt Vernon Church
PRECINCT 1 BRINDLEY
(Sheet 63)
(Sheet 65)
T. 8 S.
20
21
22
23
29
28
27
26
29
32
33
34
35
(Sheet 70)
0
1/2
1 Mile
0
5000 Feet



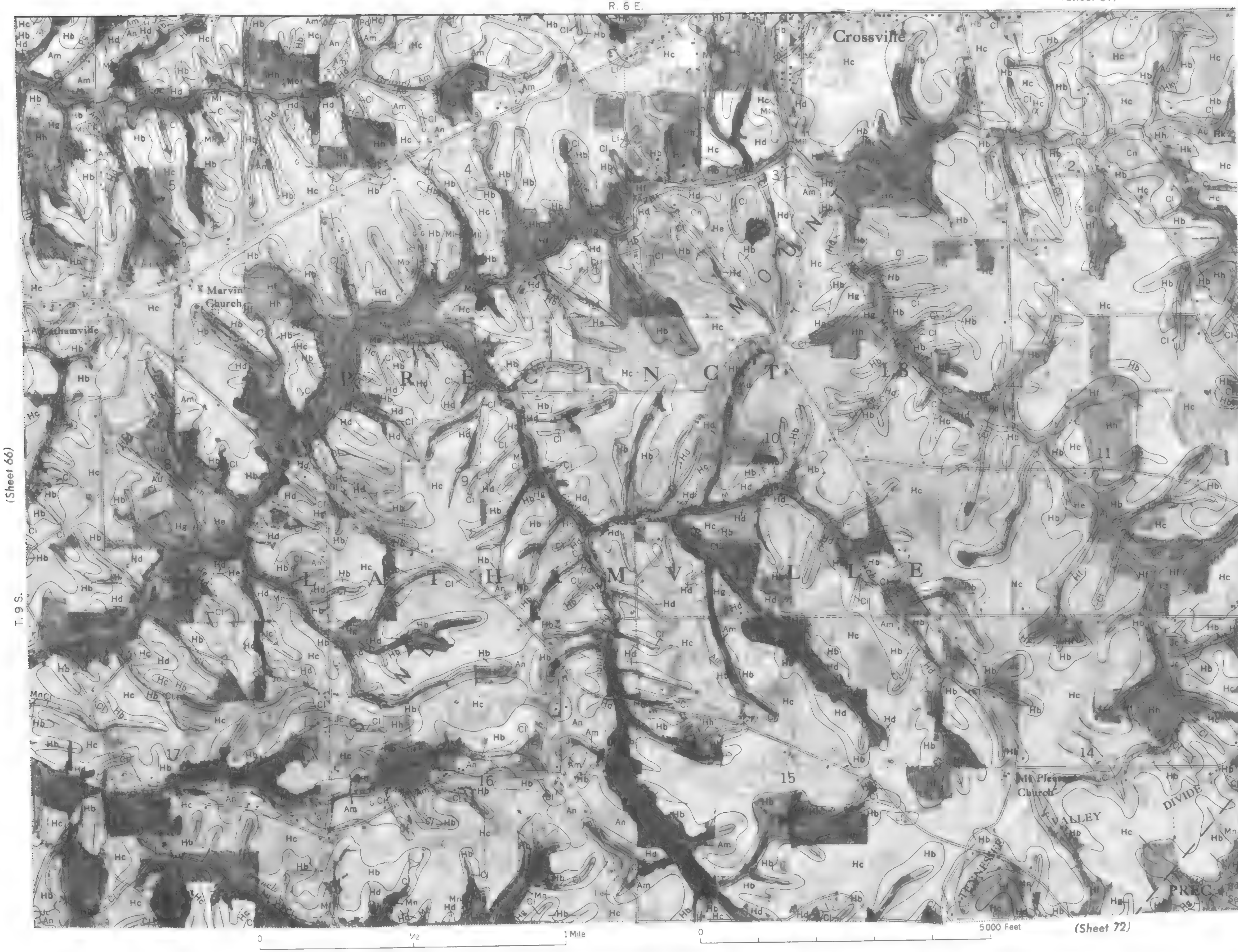
0 1/2 1 Mile

0 5000 Feet


(Sheet 60)
R. 5 E. | R. 6 E.
N
CLARK CEMETERY
Kilpatrick
New Hope Church
FORESTER CEMETERY
PRECINCT 27
PRECINCT
LATHAM
MARSHALL COUNTY
(Sheet 67)
T. 9 S.
(Sheet 71)
0
1 Mile
5000 Feet

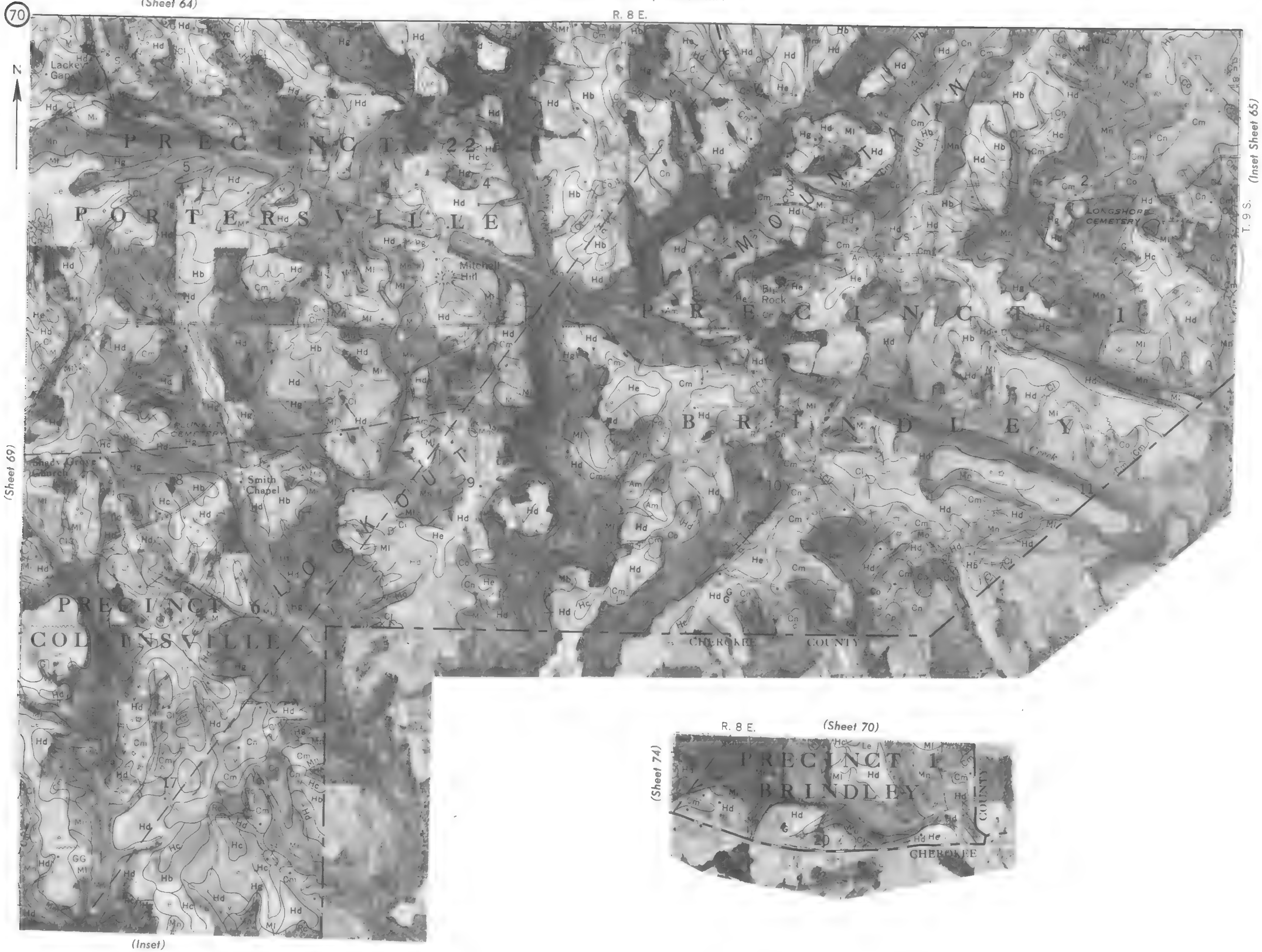
R. 6 E.

(Sheet 61)


Crossville
Marvin Church
PRECINCT
LATHAMVILLE
MOUNTAIN
Mt Pleasant Church
VALLEY
DIVIDE
PREC.
N
(Sheet 66)
(Sheet 68)
(Sheet 72)
T. 9 S.
0
1/2
1 Mile
0
5000 Feet

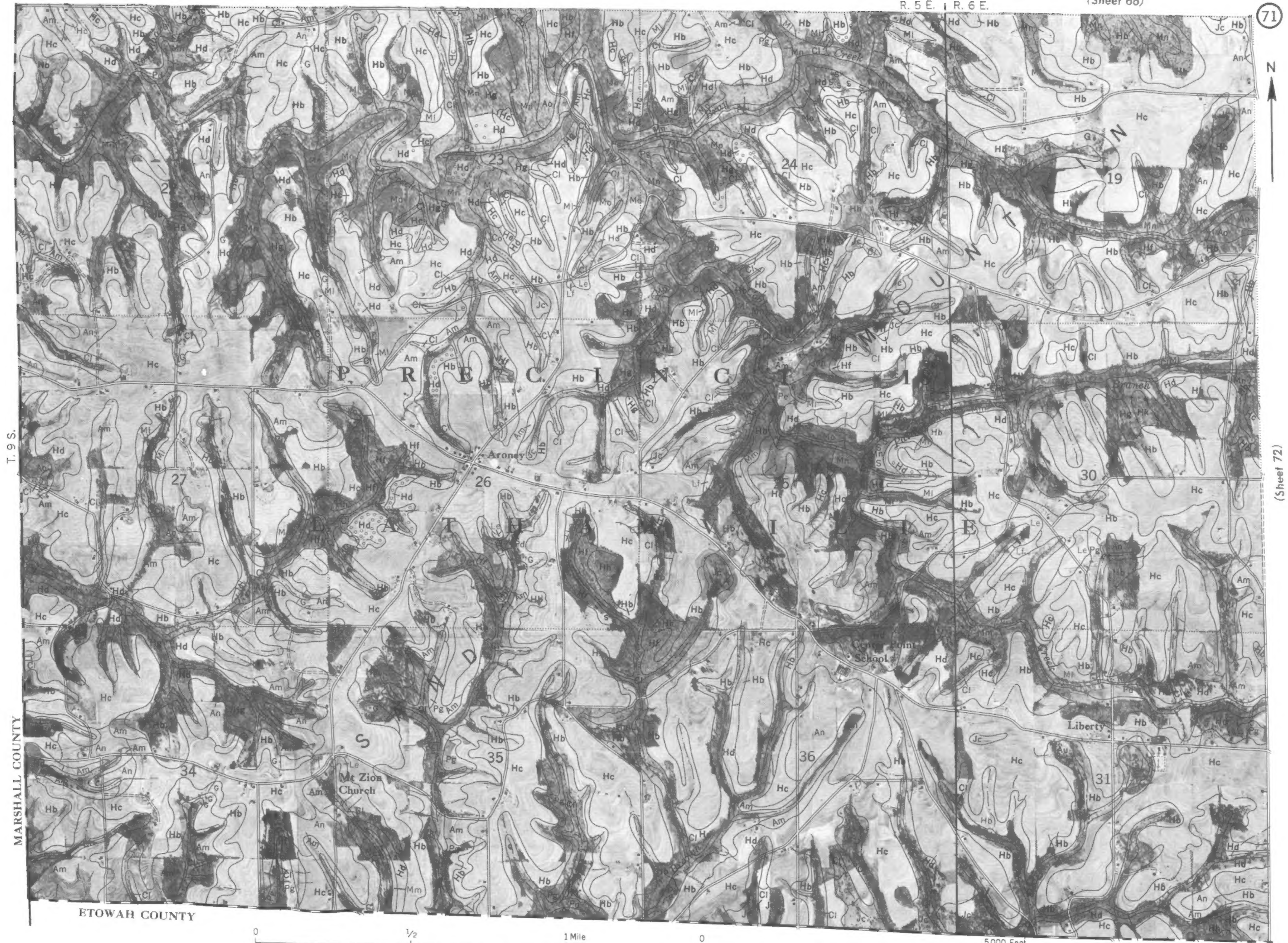

68
(Sheet 62)
R. 6 E. | R. 7 E.
N
PRECINCT 18
LATHAMVILLE
PRECINCT 5
VAN BUREN
PRECINCT 4
HENDRIXVILLE
PRECINCT 6
COLLINSVILLE
Griffen Falls
Pleasant Valley Church
EDWARDS BRIDGE
NICHOLSON CEMETERY
Vernon Church
(Sheet 67)
(Sheet 69)
(Sheet 73)
0
1/2
1 Mile
0
5000 Feet


R. 7 E.
R. 8 E.
(Sheet 63)
(Sheet 68)
(Sheet 70)
(Sheet 74)
T. 9 S.
N
PRECINCT 5
VAN BUREN
PRECINCT 22
PORTERSVILLE
PRECINCT 6
COLLINSVILLE
BIG WILLS VALLEY
BIG RIDGE
WILLS VALLEY
LITTLE RIDGE
LOOKOUT MOUNTAIN
SOUTHERN
Collinsville
Paley Hill
PALEY CEMETERY
COLLINSVILLE CEMETERY
Lackey Gap
Massey Cove
Hales Gap
CHEROKEE CO
0
1/2
1 Mile
0
5000 Feet



0 1/2 1 Mile

0 5000 Feet


R. 5 E. | R. 6 E.
N
T. 9 S.
(Sheet 72)
MARSHALL COUNTY
ETOWAH COUNTY
PRECINCT 18
LATHAMVILLE
SAND MOUNTAIN
Aroney
Center Point School
Liberty
Mt Zion Church
0 ½ 1 Mile
0 5000 Feet

72

(Sheet 67)

R. 6 E.

(Sheet 71)

(Sheet 73)

T. 9 S.

ETOWAH COUNTY

0 1/2 1 Mile

0 5000 Feet

DE KALB COUNTY, ALABAMA


(Sheet 69)
R. 7 E. R. 8 E.
N
CHEROKEE COUNTY
T. 9 S.
(Inset Sheet 70)
(Sheet 73)
WILLS VALLEY
PRECINCT 6
COLLINSVILLE
LOOKOUT MOUNTAIN
PRECINCT 1
BRINDLEE
CHEROKEE COUNTY
ETOWAH COUNTY
0 1/2 1 Mile
0 5000 Feet